# EFFECTIVENESS OF CONSTRUCTIVIST BLENDED INSTRUCTIONAL PARADIGM

A Thesis

Submitted in partial fulfillment of the requirements for the award of the degree of

**DOCTOR OF PHILOSOPHY**
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**By**

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# DECLARATION

I declare that the thesis entitled **"Effectiveness of Constructivist Blended Instructional Paradigm"** has been prepared by me under the guidance of Dr. (Mrs.) Shakuntla Nagpal, Prof. & Former Head, Department of Teacher Education & Extension (DTEE) NCERT, New Delhi. No part of this thesis has formed the basis for the award of any degree or fellowship previously.

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# CERTIFICATE

I certify that Dinesh Kumar has prepared his thesis entitled **"Effectiveness of Constructivist Blended Instructional Paradigm"** for the award of Ph.D. degree of the Lovely Professional University under my guidance. He has carried out the work at the School of Education, Lovely Professional University, Phagwara, Punjab, India.

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## ABSTRACT

The quality, competence, and character of teachers are amongst the most significant factors which influence the quality of school education and its contribution to national development. The present study developed Constructivist Blended Instructional Paradigm (CBIP), explored its effectiveness on teaching competencies of student teachers in Teacher Education Institutions (TEIs), and the academic achievement of learners in schools. The study also ascertained the efficacy of CBIP through the perception of learners and cooperative school teachers/principals. Teacher education and school education have been treated as a continuum. Student teachers were developed to function as teachers in schools during teaching internships.

The CBIP is a harmonious blend of all pedagogical approaches (behaviorist, cognitivist and constructivist) and technology in a balanced and pragmatic manner. It drew the best from all available resources as per the Indian context and circumstances. In this, knowledge was created situationally, by using contextual technological support matching with the ongoing textbook content. In this way, it is a blending of traditionalism and modernism, a harmonious practical combination of East and West.

In India, efforts have been made to integrate various approaches of teaching and learning suitable to the unique Indian educational situations. The effort goes back to Lunzer (1976), who had remarked that the objective of cognitive development through pedagogy can be brought about by rapprochement among various classical approaches. However, in India, Dave and Nagpal (in 1980s) furthered this process. At that time, however, technology was not so popular. The present learners and teachers must balance 4 H's i.e. Head (knowledge), Heart (emotions), Hand (skills), and Highway (technology). Earlier more stress has been on cognitive development i.e. head at the cost of other 3Hs in school learning. So memory, cramming, the cut-throat competition took a lead. Heart (feeling and emotions of the learner) and hands (skills) were sidetracked. During 1980s and 1990s, some work in this direction has been done in India, where the efficacy of the rapprochement was seen by merging it with classical teaching paradigms. The Objective

Based Teaching (Bloom, 1956) provided guidance and direction for instructional objectives and testing of the same simultaneously by Real Learning Outcomes (RLO). Based on this, the Advanced Curriculum Model of Cognitive Learning (ACMCL) was developed in NCERT, New Delhi and experimented upon in RIEs especially in Mysore and Ajmer.

Theoretically, CBIP has its origin in the ACMCL model, as it is also a balanced & harmonious blend of different pedagogical approaches and learning theories. The best elements of different theories (Piagetian constructivism, Blooms models, socio-cultural theory, situated learning theory, Cognitive Apprenticeship Model, Merrill principles, Gagne's Nine events, Dick and Carrey Model, and Successive Approximation Model) were integrated with the best elements of technology (as per TPACK and blended learning models). Thus, this paradigm is operationally defined and empirically verified as Constructivist Blended Instructional Paradigm (CBIP).

The mixed-method research approach was used as it involved the collection & analysis of quantitative and qualitative data. The quantitative data were collected through rating scales and experimentation and qualitative data were collected through focus group discussions, interviews, and technological support (pictures and videos). In experiments, involving humans as subjects, the process always influences the perspectives of the subjects. So, interviews and focus group discussions were used to understand the socio-cultural contexts for accurate interpretations. Therefore, it also used the hermeneutics approach of qualitative research. In the conclusive interpretation, the research illustrated the quantitative outcomes with qualitative findings and synthesizes a complete understanding of the effectiveness of CBIP, as a convergent parallel research design (also called concurrent triangulation).

The sample was multi-dimensional involving 37 B.Ed. student teachers (from Science, Mathematics, English, Social science, and Hindi subjects), 25 cooperative school teachers/principals, and 796 learners of 6th to 10th grades from 18 Senior Secondary Schools of Doaba region of Punjab, India. It was an extremely difficult proposition to experiment at schools due to the definite instructional goals set down by the school board. It was also difficult to convince school authorities that established goals should be altered merely for the sake of testing new ideas when there was no guarantee that the results would not be calamitous. Keeping in view the above considerations, the convenience sampling technique was used.

The self-constructed tools were used to collect the data. CBIP and CBIP based lesson plans were shown to experts for content validation. CBIP was standardized on 5 student teachers (one each from Science, English, Hindi, Social Science and Mathematics) and 166 learners. CBIP based lesson plans were developed and used for five school subjects i.e. Science, Mathematics, English, Social science, and Hindi, and used as tools to teach learners of experimental groups during the treatment phase in the schools. Teaching Effectiveness Scale (TES) was standardized on a sample of 875 student teachers from three different institutions. TES scale was a 7-point Likert Scale consisting of 61 statements in five factors viz. Lesson Planning Competence, Knowledge Construction and Facilitation Competence, Technological Competence, Professional Competence, and Evaluation Competence. A sample of 242 learners from 5 schools was used to standardize the Student Perceptions Scale (SPS) towards teaching effectiveness. The SPS scale was a 5 point Likert Scale consisted of 39 statements distributed in 5 dimensions viz. Anticipatory Skill Competence, Knowledge Construction & Facilitation Competence, Technology Competence, Professional Competence, and Evaluation Competence. The content validity of the interview schedule for cooperating school teachers/principals and interview schedule for learners was established through Content Validity Ratio calculations.

The study was divided into three phases viz. pre-treatment, treatment, and post-treatment phase. In the pre-treatment phase orientation was given to student teachers, cooperative school teachers/principals, and learners. Student teachers were oriented to develop lesson plans as per CBIP using blended learning strategies and trained in teaching through CBIP in simulated teaching. One-to-one orientation session on CBIP and blended learning strategies was given to Cooperative school teachers/principals. Before the treatment phase, learners were oriented within groups of 15-20 about the effective constructivist teaching & learning processes, learning objectives, the introduction of topic, knowledge construction, online & offline resources, professional ethics of teaching, rubrics, blogs, portfolios, and characteristics of good PowerPoint presentation.

Control and experiment groups were formed in each school. The data was collected in the treatment phase. Every seventh lesson of the student teachers was observed through the TES scale or online/offline video recordings. Total Five observations of student teachers were conducted; one in simulation and the other four in real classrooms with learners from grades 6th to 10th. The experimentation phase consisted of 50 working days equivalent to 300 hours in 18 schools. Total 712 hours & 15 minutes of treatment were given to learners, 1221 lessons were delivered in the classes through CBIP out of which 175 lessons were observed by using the TES scale. So, the student teachers were observed for 107 hours & 55 minutes through self or technology support which corresponds to 18 days (6 hours a day). The perceptions of students were also recorded through the SPS scale. Personal feedback sessions were organized for student teachers. Total 36 focus group interviews with learners and 25 informal interviews with five school principals and 20 school teachers were conducted.

The statistical techniques like paired-samples t' test, independent sample t' test, and The Kendall's Coefficient of Concordance were used. Qualitative data analysis techniques like analysis of mean ratings, synthetic indexes, percentage calculations, reflexive analysis, and semiotic analysis were used.

The whole data analysis revealed a significant effect of the Constructivist Blended Instructional Paradigm on the teaching effectiveness of student teachers in teacher preparation. Student teachers teaching science showed the highest teaching effectiveness and those in mathematics showed the lowest. Student teachers showed maximum development in Lesson planning competence and least in Evaluation Competence. The student teachers teaching Hindi and Social science showed maximum development in Technological Competence, those teaching English and Maths showed maximum development in Knowledge Construction & Facilitation Competence whereas those teaching Science have shown maximum development in Lesson Planning Competence.

A significant effect of CBIP was found on the academic achievement of learners. The experimental group showed more improvement in academic achievement as compared to the control group. A significant effect of CBIP was found in Science, Maths, and Social Science but an insignificant effect was found in English and Hindi subjects. The empirical findings and synthetic index analysis confirmed that the average of mean ratings of dimensions of teaching effectiveness in these subjects is just near to the overall average of mean ratings of all the subjects. Moreover, learners in the experimental group showed improvement in their academic achievement, so organismic and environmental factors played important roles. In the control group, mastery through memorization of subject matter was promoted at the cost of the development of language skills. In the traditional setup, the teaching-learning process of language teaching and its assessment was at the knowledge level whereas, in the experimental group, the focus was on developing language skills and HOTS. So, the results are in the expected direction.

The perception of school teachers revealed that student teachers developed their skills in lesson planning, pedagogical knowledge, technology uses, classroom management, and evaluation. 100% of the school teachers supported constructivist blended learning strategies as these strategies resulted in higher attainments in the learners. The learners perceived student teachers as excellent teachers as they were helping the slow learners, showing concern with every student in the class, giving clear and precise instructions, using a variety of resources to get responses from students, asking questions about the previous knowledge, showing positive behavior towards students and encouraging students to explore answers. As per learners the student teachers had not shown improvement in black/whiteboard work and motivating students to perform activities. Maximum students perceived that they learned new things with technology integration in the teaching-learning process and their learning got extended from the classroom to the outside world.

The traditional mental setup and fixed behavior of school teachers towards traditional school practices was a major challenge to the experimentation. The non-availability of technological resources and slow internet connections were some of the limitations encountered during the experimentation phase.

The findings of the study recommend proper training in using blended strategies for everyone involved in the process of instruction and various funds, efforts at the local and national level need to be directed towards procuring resources for schools for better quality management of educational practices. The CBIP should be used to train teachers in teacher education. As CBIP intervention improved the teaching effectiveness of student teachers, their chances of getting employment also get enhanced. Every Teacher Education Institution should focus on developing effective skills among student teachers. The experience and the constant reflection is the key for effective teacher preparation. The ability to reflect should be developed in the teacher preparation phase. An interconnected cycle of theory and practice ‘Theory-Practice-Theory’ needs to be practiced.

The results strongly suggest that while CBIP does help in enhancing teaching effectiveness and learner development, its proper application in teacher preparation can offer more fruitful results. Further studies should be conducted for more substantial and sustained empirical evidences in this direction. However, there is no gain in saying that it opens up a promising avenue for effective teacher preparation.

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**Date: ________________** **Dinesh Kumar**

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| S.NO. | ABBREVIATIONS | FULL FORM |
|---|---|---|
| 1 | **ABLP** | Activity Based Lesson Planning |
| 2 | **ACMCL** | Advanced Curriculum Model of Cognitive-Learning |
| 3 | **ADAPT** | Active Discovery And Participation thru Technology |
| 4 | **ADDIE** | Analyze, Design, Develop, Implement, and Evaluation |
| 5 | **ARCS** | Attention, Relevance, Confidence and Satisfaction |
| 6 | **ASC** | Anticipatory Skill Competence |
| 7 | **ASSURE** | Analysis, Statement of the objectives, Selection of Media, Utilize technology, media & materials, Require Learners Performance, and Evaluate & revise |
| 8 | **AUT** | Authentic |
| 9 | **AV** | Audio-Visual |
| 10 | **B. Ed.** | Bachelor of Education |
| 11 | **B. El. Ed** | Bachelor of Elementary Education |
| 12 | **BL** | Blended Learning |
| 13 | **BSCS** | Biological Sciences Curriculum Study |
| 14 | **CAM** | Cognitive Apprenticeship Model |
| 15 | **CBIP** | Constructivist Blended Instructional Paradigm |
| 16 | **CBSE** | Central Board of Secondary Education |
| 17 | **CCE** | Continuous and Comprehensive Evaluation |
| 18 | **CD-ROM** | Compact Disc Read-Only Memory |
| 19 | **CK** | Content Knowledge |
| 20 | **CMC** | Classroom Management Competence |
| 21 | **COL** | Collaboration |
| 22 | **DES** | Design |
| 23 | **DIETs** | District Institute of Elementary Teachers |
| 24 | **EC** | Evaluation Competence |
| 25 | **e-learning** | Electronic Learning |
| 26 | **ETE** | Elementary Teacher Education |
| 27 | **FEE** | Feedback |
| 28 | **GTCS** | General Teaching Competency Scale |
| 29 | **HODs** | Head of Departments |
| 30 | **HOTS** | Higher Order Thinking Skills |
| 31 | **IBM** | International Business Machines |
| 32 | **ICTs** | Information and Communication Technologies |
| 33 | **ID** | **Instructional Designing** |
| 34 | **IDDIRR** | Introduce, Demonstrate, Develop, Implement, Reflect and Revise |

| | | |
|---|---|---|
| 35 | **KCFC** | Knowledge Construction & Facilitation Competence |
| 36 | **KTES** | Kulsum Teacher Effectiveness Scale |
| 37 | **LOTS** | Lower Order Thinking Skills |
| 38 | **LPC** | Lesson Planning Competence |
| 39 | **MCQ** | Multiple Choice Question |
| 40 | **MOM** | Motivating Opportunities Model |
| 41 | **MOOCs** | Massive Open Online Courses |
| 42 | **NCF** | National Curriculum Framework |
| 43 | **NCFTE** | National Curriculum Framework Teacher Education |
| 44 | **NCT** | National Capital Territory |
| 45 | **NCTE** | National Council of Teacher Education |
| 46 | **NEP** | National Education Policy |
| 47 | **NPTEL** | National Program on Technology Enhanced Learning |
| 48 | **OBT** | Objective Based Teaching |
| 49 | **Obs** | Observation |
| 50 | **OERs** | Open Educational Resources |
| 51 | **PC** | Professional Competence |
| 52 | **PCK** | Pedagogical Content Knowledge |
| 53 | **PCKCs** | Pedagogical Content Knowledge in Contexts |
| 54 | **PK** | Pedagogical Knowledge |
| 55 | **PISA** | Programme for International Student Assessment |
| 56 | **RCET** | Research Center for Educational Technology |
| 57 | **REF** | Reflecting |
| 58 | **ROL** | Role |
| 59 | **SAM** | Successive Approximation Model |
| 60 | **SPS** | Student Perception Scale |
| 61 | **SQD** | Synthesis of Qualitative Evidence |
| 62 | **SUCCESS** | Situational, Utilization, Competence, Content, Emotional, Social, and Systemic |
| 63 | **SWAYAM** | Study Webs of Active-Learning for Young Aspiring Minds |
| 64 | **TEIs** | Teacher Education Institutions |
| 65 | **TES** | Teaching Effectiveness Scale |
| 66 | **TC** | Technology Competence |
| 67 | **TCK** | Technological Content Knowledge |
| 68 | **TK** | Technological Knowledge |
| 69 | **TM** | Technology Mapping |
| 70 | **TPACK** | Technological Pedagogical Content Knowledge |
| 71 | **TPCK** | Technological Pedagogical Content Knowledge |
| 72 | **TPCKC** | Technological Content Knowledge in Contexts |
| 73 | **TPK** | Technological Pedagogical Knowledge |
| 74 | **ZPD** | Zone of Proximal Development |

| | | |
|---|---|---|
| 75 | **A** | Average |
| 76 | **BA** | Below Average |
| 77 | **E** | Excellent |
| 78 | **G** | Good |
| 79 | **P** | Poor |
| 80 | **VG** | Very Good |
| 81 | **VP** | Very Poor |
| 82 | **AMOS** | Analysis of a Moment Structures/Analysis of Covariance or Causal Modeling Software |
| 83 | **AVE** | Average Variance Extracted |
| 84 | **CFA** | Confirmatory Factor Analysis |
| 85 | **CFI** | Comparative Fit Index |
| 86 | **CR** | Convergent Validity |
| 87 | **CVR** | Content Validity Ration |
| 88 | **DF or df** | Degree of Freedom |
| 89 | **E** | Number of Experts Rating the Item |
| 90 | **EFA** | Exploratory Factor Analysis |
| 91 | **KMO** | Kasier Meyer – Olkin |
| 92 | **MSA** | Measure Of Sample Adequacy |
| 93 | **M** | Mean |
| 94 | **N** | Number/Total Number of Experts |
| 95 | **RMSEA** | Root Mean Square Error of Approximation |
| 96 | **SPSS** | Statistical Package for Social Science |
| 97 | **SRMR** | Standardized Root Mean Square Residual |
| 98 | **TLI** | Tucker-Lewis Fit Index |
| 99 | **p-value** | Probability Value |
| 100 | **SD or σ** | Standard Deviation |
| 101 | **$SE_D$** | Standard error of Difference |
| 102 | **t'/z'-value** | Test-statistic |
| 103 | **W** | Kendall's Coefficient of Concordance |
| 104 | **X** | Raw Score |
| 105 | $\chi^2$ | Chi-square |

# CHAPTER I

# INTRODUCTION

**1.1 THEORETICAL ORIENTATION**

**1.1.1 Constructivism**

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# CHAPTER I
# INTRODUCTION

Quality Teacher Education is considered prerequisite for effective school education. Teacher Education aims to develop professional teachers along with equipping them with the necessary knowledge, values, and skills. The School Education creates a satisfactory working environment for them to realize their full potential. Therefore, Teacher Education (TE) and School Education (SE) are supplementary and complementary to each other and work in collaboration. For ensuring quality preparation of prospective teachers, the National Council for Teacher Education (2014) regulations recommended 2-4 years teacher preparation programmes with increased duration of teaching internship. The National Education policy (2020) also proposed an India-centered education system for transforming society into a knowledge society by ensuring quality education to all. It further envisioned high quality training in content, pedagogy, and practice by complete insurance of 4 years of professional teacher preparation programmes by 2030.

In India, the educational transformations are still in the beginning stage and require empirical evidences for their effectiveness on the quality preparation of teachers. 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. Now, although the children have enrolled in schools yet the quality education for all inside the classroom is a distant dream.

In the present digital world, the diversity of learners in terms of knowledge, skills, and their needs and aspirations are major challenges before student teachers. Such challenges emerge because of a mismatch between the perspective and philosophy of schools and TE institutions about the role of the teachers as taught in TEIs and as required in schools. The training of student teachers is a major area of concern in education. A little difference has been found in the performance of learners taught by a teacher having a professional teaching degree and those taught by a teacher having another undergraduate degree. The perception studies on student teachers towards two-and four-years teacher education programmes reveal a mixed response as the focus shifted from quality to economic compatibility, and longer durations of teaching internship without remunerations, which is another disturbing area. Moreover, there is a lack of coordination between TEI and cooperating schools. The mentoring system, in which school subject teachers mentor the student teachers, is not working satisfactorily. Some studies also point to the lack of well-qualified teacher educators in TEIs. In such conditions, the quality training of student teachers seems to be an impossible task.

The student-teachers need to be developed as independent thinkers, reflective practitioners with appropriate vision, knowledge, attitudes, and skills required in designing effective classroom strategies to meet the diverse needs of the learners in the classrooms. There, arises a need to incorporate flexibility in planning and building the capabilities of student teachers to independently plan pedagogies suiting to the needs and demands of every learner in the classroom.

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 (Noon, 2012).

National Education Policy (NEP), 2020 suggests that technology plays 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 emergence of new technologies has influenced the philosophical and psychological assumptions underlying the prevailing system of instruction. The enormous potential of new Information and Communication Technologies (ICTs) needs to be used to their fullest in the teaching-learning process.

The latest technologies (Times of India, Nov 2019) are making education more skill-oriented and inclusive. In India, more than 50 schools are using Next Assessment Software, which uses artificial intelligence. It customizes questions to each student according to their learning needs. Technology encourages adaptive assessments. Another platform of student engagement & employability allows students to focus on skills that are not part of their curriculum. Remote Proctoring is another artificial intelligence platform that allows teachers to remotely invigilate online exams. This technology captures the physical movements of the candidate, and send signals if students try to open another window. It ensures cost-effectiveness. In the future physical invigilation will be replaced with digital invigilation. In some government schools of Tamil Nadu, a state in India, attendance registered are replaced by mobile app. Traditional attendance takes 10 minutes, but this app takes one minute. The teacher takes some snapshots, uploads them to the cloud, and attendance is marked. It saves time & makes the system efficient. The parents feel worried about the privacy dimension of their wards. So, the need is to strike a balance between technology & human interaction. The overdependence on technology is harmful because learning needs time, hard work & reflection, whereas technology provides instant gratification.

The vision of inclusiveness, equitable quality at all levels, and reduction of the weight of school bags can be redeemed with the help of efficient and right use of technology in education (Nishank, 2019). It may be further noted that technology alone cannot provide solutions to all problems. Technology, here is a tool that is being used with pedagogy. The pedagogy used with technology is more important than technology alone.

The integration of technology in instructional systems has led to the emergence of e-learning, online learning, hybrid learning, mobile learning, blended learning, etc. Such technological innovations have revolutionized the education system. In the past, researchers have favored blended learning systems over traditional and fully online systems of instruction (Marques and Woodbury et.al, 1998; Singh, 2003; Dziuban, Hartman and Moskel, 2004; Guzer & Caner, 2013). Blended learning systems include appropriate blending of resources from traditional face-to-face and online learning systems.

As the number of philosophies, psychological theories, and technological innovations is influencing the instructional system, it is very difficult to find the best instructional procedure. Our learners are not ordinary, but digital learners and therefore, they want us to teach and lead them in the way they desire and not the way we are comfortable with. Along with the educational needs of learners, pedagogical content knowledge and its effective transaction is required.

These discussions motivate us to think and develop a technology-based instructional paradigm (model) that suits the needs of all learners and also enhances the pedagogical skills of teachers as well. So, the purpose is to develop a sound theoretical base leading to a holistic conceptual framework for an instructional paradigm for teacher training institutions. The instructional paradigm in the context is constructivist, situational, and blended. In this instructional model, knowledge creation is situational, keeping in view the readily available resources along with the prescribed textbook content. It combines all pedagogical approaches (behaviorism, cognitivism, and constructivism) in a balanced pragmatic way, where ever they are easily benefitted in a suitably justified manner. The emphasis is to draw the best from all these approaches as per the context & circumstances. In a way, it is a blending of traditionalism and modernism, a harmonious practical combination of East & West. It creates a sequential procedure of instructional experiences to make learning more authentic and efficient.

## 1.1 THEORETICAL ORIENTATION

The purpose of this research work is to develop an instructional paradigm that is holistic, contextual, need-based, and flexible. The main objectives of the paradigm are to solve the problems of pedagogy and learner engagement, and develop pedagogical skills among student teachers, and concurrently enhance the educational attainments of learners in the school. So, the development process requires the incorporation of constructivist and blended strategies; and the testing phase requires the experimental set up in teacher education to test the efficacy of paradigm on teaching effectiveness of student teachers and academic performance of learners. At this point, the study raises some important questions like, how emerging technologies have impacted the theories of teaching and learning. How constructivism has changed its nature in the technological environment? Why there is an urgent need to develop new models of instructional designing? How appropriate blends can be developed? How constructivism and blended learning can together influence the instructional designing systems? How teaching effectiveness or teaching competencies of prospective teachers can be improved?

So, to understand the research process and later its finding and implications, it is pertinent to understand the theoretical framework within which the entire research was carried out. The theoretical framework includes the conceptual history and present status of constructivism, instructional designing, blended learning, teaching effectiveness, and theoretical framework of paradigm.

### 1.1.1 Constructivism

Constructivism is a philosophical belief that learners construct their understanding of reality (Oxford, 1997). The meaning of the term construct is based upon interactions with surroundings. In 1710, Vico proposed that knowledge is constructed by the knower. He also coined the term constructivist. The concept of constructivism may also be traced back to Socrates's dialogues with his followers, which is a form of a cooperative argumentative dialogue between individuals based on mutual questions to stimulate critical thinking for drawing out ideas. It examines a text discussion on the belief that all knowledge is connected. The constructivist educators still use Socratic ides in planning new learning experiences.

As discussed, while Vico coined the term constructivist, Piaget is considered as an original constructivist. In the 20th century, John Dewey (1859-1952) and Jean Piaget (1896-1980) developed theories of developmental stages in education, which form the basis for Progressive Education leading to the evolution of constructivism. Dewey emphasized the social contexts of learning, emphasized interaction with the environment with the active involvement of learners for best learning. He advocated that children must be given adequate learning opportunities. Learning conditions should be created to link present content to previous experiences, hence experiential, inquiry-based and problem-based learning are important. These ideas form a key part of constructivist learning. All his educational ideas are compiled in two of his books Democracy and Education (1916) and Logic (1938), much ahead of Piaget and Vygotsky.

Dewey favored a more balanced approach to education, with teacher, learner, and content having equal importance. He considered the teacher as a facilitator, guide, providing opportunities for students to develop as active and independent learners.

Piaget (1896–1980) through his theory of cognitive development proposed a proper framework to understand the structure, functioning, and cognitive network of the human mind. The four stages of theory viz. the sensorimotor (0-2 years), preoperational (2-6 years), concrete operational (7-11years), and formal operational (11-16 years) focus on the development of thinking patterns from infancy to adolescence through the processes of assimilation and accommodation. Several insights from this theory are being used in education today like curriculum planning & transaction as per cognitive level, creating opportunities for assimilation & accommodation, the role of parents and teachers. Such implications of this theory have shaped the foundation for constructivist education.

Later Vygotsky, Bruner, and Ausubel through their theories gave new perspectives to theory and practice in constructivism. Vygotsky (1896-1934) introduced the social aspects of learning into constructivism. He proposed the following elements which form the base of constructivism;

- Learning is not transmission but meaningful and purposeful interaction.
- Language, social play, and culture play an important part in the learning process.
- Instructions must be given just above the level of children. It is where maximum learning or development occurs.
- Teacher is facilitator and constructor of learning conditions.
- Children must receive assistance from more competent individuals to learn new knowledge & skills.

Bruner (1978) emphasized the social nature of learning through the process of scaffolding. He emphasized that language is the cause of cognitive development and not the consequence. Schools should not waste time to match the complexity of curriculum to the level of cognitive development in children. Instead, scaffolding and spiral curriculum (Bruner, 1960) approaches should be adopted. The complex ideas should be taught at a simplified level first and then should be revisited at a complex level. The spiral curriculum also helps the children in constructing their knowledge, which is also called discovery learning (Bruner, 1961).

Ausubel hypothesized that people acquire knowledge primarily by being exposed directly to it rather than through discovery (Flok, 2010). He conceptualized the idea of cognitive schemes. Ausubel theorized that learning of new knowledge depends upon the previous knowledge. So, the construction of new knowledge depends upon existing cognitive structures. Based on this, he proposed subsumption theory which leads to the formation of the Advance organizer model of teaching.

Glasersfeld (1974) stated that knowledge is created as per understanding, based on previous knowledge, experience & beliefs. Whenever there is no proper assimilation, an individual try to change prior experience or knowledge. Individuals create their reality which tells nothing about existing reality and only helps to function in a contextual environment. Thus, knowledge is invented not discovered.

Papert (1991) stresses the use of computers in teaching and integrated computer & information technology in a constructivist environment. He had worked with Piaget from 1958 to 1963 and was greatly influenced by his work. Piaget describes how children think, what children are interested in and able to achieve at different stages of development. He created the LOGO programming language to teach Mathematics, where students learn through designing and sharing within a collaborative environment.

In a nutshell, although constructivism has influenced several disciplines it does not correspond to a specific pedagogy rather is a philosophy and psychology to be applied in teaching-learning processes for better results.

### 1.1.2 Instructional Designing

The origin of instructional designing can be traced back to World War II (1939 – 1945) when training materials for the military personal were developed (Dick, 1987). At that time, psychologists and educationists solved instructional issues by working upon research and theory of instruction, instructional principles, learning, and human behavior. They viewed training as a system, and the number of designs and evaluation procedures (Dick, 1987) came into existence like task analysis of Miller on the military projects (Miller, 1953, 1962). Skinner (1954) developed programmed instructional material based on his operant conditioning theory. He emphasized small steps, active responses from learners, immediate feedback, and self-pacing in instructional designing. He focused upon formulating specific behavioral objectives, deciding and developing strategies to attain objectives along with the procedure to try out and revision, and validating the instructional programme.

Programmed instruction led to the creation of a small but effective self-instructional system called the technology of instruction (Heinich, 1970). Bloom (1956) emphasized measuring different types of learning outcomes and proposed taxonomy of educational objectives covering lower and higher levels of learning hierarchically. It helped in specifying objectives, task analysis, and evaluations through a systematic process approach.

Mager (1962) further proposed a performance-oriented instructional procedure also called as Criterion Referenced Instruction (CRI) framework which includes elements from Gagne's Knowles and Rogers's theory of learning.

Gagne, Glaser, and Silvern used the terms like systematic instruction, instructional design, system development, and instructional system (Raiser, 2001) to describe such processes. Glaser (1963) applied criterion-referenced testing to assess entry-level behavior and learning outcomes.

In 1965, Gagne identified five different types of learning and suggested that each type requires different types of instructions and different internal and external conditions. He proposed that learning tasks and intellectual skills can be organized in a hierarchy according to the level of complexity. This learning hierarchy formed the basis for instructional sequencing which later acted as the foundations of instructional design practices.

Scriven (1967) recommended field tryouts of developed instructional material before applying them in actual practice. It facilitated the evaluation of materials in their formative stages and necessary revisions as per the needs. This led to the emergence of formative evaluations. During the 1940s and the 1950s, Lumsdaine, May, and Carpenter also stressed the need for evaluating instructional materials in formative stages (Cambre, 1981).

During the 1960s, the Individualized Instructional Model, (The Keller Plan) was developed by Keller. It is also called the personal system of instruction which suggested that instructions should be based upon the educational needs and skills of every learner. It also gave attention to providing effective resources to learners and continuous assessment of learning. In the 1970s, many new models were developed for designing instructions systematically (like Gerlach & Ely, 1971; Kemp, 1971; Gagne & Briggs, 1974; ADDIE, 1975; Dick & Carey, 1978) and as many as 40 instructional models were identified (Andrews and Goodson, 1980).

The instructional designing process was influential in business, industry, and military (Morgan, 1989) but in the public schools, basic instructional design processes were used in curriculum development (Spady, 1988), and some textbooks on instructional design were produced (Dick & Reiser, 1989). However, the impact of such models on instructions was very little (Rossett & Garbosky, 1987).

Later in the 1980s, the emergence of computers greatly influenced the process of instructional designing. The development of computer-based instruction was the major change that mechanized the instructional design process (Merrill, Li, & Jones, 1990, 1990). One of the most significant models developed was the Cognitive Apprenticeship Model (CAM) developed by Brown, Collins, and Newman, 1989 from Situated Learning theory (Brown, Collins, and Duguid, 1989). As per situated learning theory, all knowledge is situated within the activities of the social, physical, and cultural environment. The CAM model successfully highlights the role of teacher/mentor/subject experts in the development of cognitive and meta-cognitive skills among learners. It gave modeling, coaching, scaffolding, articulation, reflection, and exploration as important strategies in both offline and online learning environments. In 2002, Merrill proposed five principles of instruction centered on problem-solving. He suggested that for truly effective learning experiences the online learners need to be actively engaged with online content through the process of task-centered activation, demonstration, application, and integration. The other factors which impact the process of instructional procedures are applications of cognitive psychology (in the 1980s) and constructivist principles (in the 1990s). As compared to cognitive instructional design practices, constructivist processes have greatly impacted the process (Dick, 1987; Gustafson, 1993). The instructional principles associated with constructivism include solving complex and realistic problems; working together; considering multiple perspectives; and taking ownership of the learning process (Driscoll, 2000).

School museums (1905), visual and audio-visual instruction (1908, the 1930s), use of media during World War II, instructional television (1950s & 1960s), computers (1950s to 1995), and the Internet (2000) were few significant milestones in the development of instruction delivery processes (Reiser, 2001). It was found that whenever any new medium enters the education scenario, there was great interest and enthusiasm in its possible effects on the instructional process. But eventually, it fades away & analysis reveals that medium has had minimal impact on such practices. But at present time computers, the internet, and digital media together have brought changes in the instructional system procedures. The emergence of virtual communities, high-speed data, online Information Communicative Technologies, (ICT), e-learning, Massive Open Online Courses (MOOCs), Open Educational Resources (OERs), M-learning has revolutionized the entire educational practice. Smartphones and tablets have become an indispensable component of instructional delivery leading to the emergence of mobile learning and blended learning systems.

### 1.1.3 Blended Learning

The idea of blending in the teaching-learning process has only changed its nature with time. The emergence of new methods, strategies, and technology has greatly influenced it. Sri Aurobindo too talked about education consisting of games, sports, intellectual and spiritual activities. Long back differently, he too emphasized the integration of values, physical, vital, mental, and psychic dimensions in the teaching and learning process. It was insisted that a teacher should be a mix of saint, yogi, and hero. In this way, his philosophy highlighted the blending of curriculum, developmental aspects along with the teacher's personality. The emergence of the Blended Learning (BL) concept may be summarized as given below;

- The emergence of blended learning may be attributed to the rise of distance learning systems using synchronous delivery media. Pitman (1840s) launches the 1st education course through distance. For effective feedback & assessments, Pitman & his students used mailed postcards.
- In the 1960s & 70s, there is the emergence of computer based training. One of the systems of that time PLATO (1968) is still in use today.
- In the 1970s & 80s with the emergence of TV-based technology, videos were being used for training purposes, and e-mails were used for question answers and feedback. This was the predecessor for the video conferencing.
- During the 1980s and 90s, primitive types of Learning management systems appeared. CD-ROMs were being used in distance learning for giving interactive learning experiences. 1998 marked the 1st generation of web-based instructions.

- In 1998, the term blended learning was 1st used in the training sector (Masie, 1998). After 2000, there is an exponential rise in blended learning systems.

Researchers around the world are confused with the definition of the term & defined the term in a wide variety (Driscoll, 2002). However, all these definitions are overlapping with each other. Singh and Reed (2001) defined it as "instruction and learning involving the combination of online and offline learning, self-paced and collaborative learning, structured and unstructured learning, custom content and off-the-shelf content, and lastly, as a combination of synchronous and asynchronous formats". Smith (2001) called it as "an educational method that uses a combination of distance education, technology, and traditional education". Lim, Morris, & Kupritz (2006) defined it as a "learning approach where different delivery modes are used to maximize student success and to reduce cost". Procter (2003) defined BL as "the effective combination of different modes of delivery, models of teaching and styles of learning". According to Chew, Jones, and Turner (2008) blended learning involves the combination of education and educational technology.

It can be summarized that Singh & Reed (2001), Orey (2002), Thomson (2002) and Bersin et al. (2003) considered blended learning as a combination of different delivery media. Smith (2001), Driscoll (2002), House (2002), & Rossett (2002) defined blended learning as a combination of different instructional methods. Whereas Reay (2001), Sands (2002), Ward & LaBranche (2002), young (2002), Rooney (2003), Lin (2008), Means et al, (2009), and Snart (2010) concluded that blended learning is the combination of online & Face-to-Face instruction.

Many researchers have considered blended learning as the combination of online & Face-to-Face instruction. Both online & Face-to-Face systems have their strengths and weaknesses and they both address the needs of varied learners. The combination of the strengths of these two systems led to the emergence of BL systems. Traditional Face-to-Face (F2F) has advantages like one-to-one interaction, collaboration, instant feedback, etc. The BL systems facilitate human interactions through video conferencing, virtual communities, collaborations through social networking sites, instant messaging, etc. So, both systems show the same level of commitment & reliability. Some novice instructors consider blended learning as a transitional phase between traditional face-to-face and fully online systems. The instructors with less technological efficiency combine some face to face resources with technology. After attaining some proficiency in handling technology they shift to fully online environments. Such instructors are not blended instructors. The blended learning instructor needs expertise in handling both traditional & online environments separately. The rationale is to synchronize, incorporate ICT & create a balance between traditional resources & ICT tools. With time, blended learning has evolved because of its pedagogic value in education. Today, blended learning may be seen as an effective combination of different modes of delivery, different media, different theories, and different models of teaching, different styles of learning and different learning environments. Blended learning should be seen as a new educational transformation for redesigning the instructional procedures/models. The redesigning of instructional procedures in line with blended learning requires well planned, systematic approach including quality pedagogical expertise, effective professional development of teachers, and proficiency in technological skills, relevant online courses, and learner support.

**Blended Learning Models**

Blended learning models are the ways, prescriptive strategies, and procedures to implement blended learning. Researchers at different levels of education designed various ways to implement BL and called them blended learning models. So, the various blended learning models are the blended learning strategies that grow out of blended instruction.

The most commonly mentioned models in blended learning literature are face to face driven model, rotation model, flex model, online lab model, self-blend model, and virtual enriched model. In face-to-face, only certain students participate in an online activity otherwise online instruction is decided by case basis whereas in the rotation model students rotate between different stations (online or face to face) through a fixed schedule. In the flex model, students are given online material and they have the opportunity to meet the teacher for on-site support. In the online lab model, students pursue a course online in labs under an untrained supervisor. The self-blend model allows students to complete additional supplementary courses online in addition to regular courses whereas in the virtual enriched model, learning is mainly online with occasional visits to face-to-face settings. Staker and Horn (2013) found no differences in the face to face and rotation model, and online lab and self-blend model. They worked with four models extracted from the original six models. These were the Rotation model, Flex model, Self-blend model, and Virtual enriched model.

The Blended Learning Universe considered Station rotation, Lab Rotation, Individual Rotation, Flipped classroom, Flex, A La Carte, and Enriched virtual model as main models of blended learning. The Lab rotation is similar to station rotation but here online learning occurs in dedicated computer labs. In the individual rotation model, unlike other rotation models, it is not necessary for a student to rotate at every station but can rotate as individual schedules set by instructor or programme. In flipped classroom model, advance online content in the form of lectures, videos, and presentations is given to students and it enables the teachers to use class time for more in-depth discussions. A La Carte model allows the student to take a course online under the supervision of the online teacher. Other models mentioned in the literature are project-based, self-directed, inside-out, outside-in supplemented & mastery-based. These all models are repetitions of earlier described models. After studying the blended learning practices of 640 schools, Blended Learning Universe (BLU) concluded that;

1. Station Rotation and Flex models are the most commonly used models.
2. In urban schools, the Station Rotation model is widely used and is followed by Flex and Lab Rotation. In suburban, however, the Flex model is widely used and is followed by Station Rotation. Whereas, in rural schools, Flex is followed by A La Carte and Station Rotation.
3. For the first 0-3 years, the most popular forms of blended instruction are Station Rotation, Flex, and then Lab Rotation.

4. The Station Rotation is mostly used in English language, arts, and math courses; however, Flex and Individual Rotation are more common in other world languages.
5. For science instruction, the Flex model is the most popular choice.
6. At the kindergarten level, schools mostly use Station Rotation which is followed by Lab Rotation. For grades 1-5, Station Rotation, Lab Rotation, and Flex are mostly used. And for high schools, Flex is followed by Enriched Virtual, Station Rotation, and A La Carte models.
7. At 6-8 grades, all rotation models and flex are commonly used and at 8-12 grades, the Flex model is widely used.

Graham (2006) classified blended learning models according to dimensions, levels, and types. The four dimensions are space, time, sensual richness, and humanness. The four levels are activity, course, program, and institution. Finally, he introduces categories of blends based on purpose which are enabling blends (focusing on accessibility & flexibility), enhancing blends (supplementing to traditional pedagogies), and transformative blends (for changing pedagogy). Out of activity level, course level, and program level, and institution level models, the course level blending is very common. At activity & course levels the blends are planned by the instructor. At the program and institution level, blends are planned by the learner. At the activity level, the blending involves traditional face-to- face and computer mediated components. Such types of blend occur in military training, higher education, or in bringing the distant experts in classrooms.

The course level blending is the combination of distinct face-to-face and computer-mediated activities. Sometimes these activities are simultaneous and sometimes in sequence but not overlapping. In Higher education, blending is mostly occurring at the program level. In this case, some courses of programme require face-to-face completion while others can be completed in distance mode. In another case, some courses of program can be completed online while others can be completed online with face-to-face sessions. In the Corporate world, the training is mostly at program level. The organizational commitments made blending at the institutional level. The corporates like IBM, Sun Microsystems incorporate blending at the institutional level. The University of Central Florida, University of Phoenix, Brigham Young University (Bonk & Graham, 2003), and Lovely Professional University, India are creating models for blending at the higher education level. At Lovely Professional University, there is a commitment to blending face-to-face and computer-mediated instruction and the students must also complete at least one course through online mode. In India, the emergence of MOOCs (Massive Open Online Courses) through NPTEL (National Program on Technology Enhanced Learning), 2003 & SWAYAM (Study Webs of Active-Learning for Young Aspiring Minds), 2017 has facilitated the blending at both program and institution level. Valiathan (2015) gave 3 types of blended learning models which are the skill-driven model, attitude-driven model & competency-driven model. The skill-driven model deals with the acquisition of specific knowledge and skills. The role of the instructor is to give feedback and support. The attitude-driven model aims to develop new attitudes and behaviors. It emphasized peer-to-peer interaction and group work. In competency-driven, the focus is on capturing tacit knowledge, where learners must observe experts at work. This classification was criticized for its mixed nature, as it is based on both learning objectives and pedagogical methods.

The blending of traditional face to face & online components is highly contextual, time & content-specific. The objective in hand, the challenges associated will determine the blending learning model. For example, if the objective is based on a constructive & collaborative vision of learning then the online group discussion model is most suitable. If the objective is of cost-effectiveness or saving online self-study model may be appropriate. Graham (2006) reported that some researchers doubt the accessibility potential of blended learning. It may be in the areas of the digital divide. Some doubts about the cost-effectiveness dimension as blended learning requires an expenditure on technical gadgets. Here the cost-saving is in terms of staff savings. Many researches (like by Graham and Dziuban) favor blended learning but others (like Russell) found no significant impact of blended learning. It is extremely difficult for researchers to drive hard experimental evidence as there are several factors to control.

The blending has its issues and challenges. The major challenge is from learners. The learners often give more weightage to face to face classroom components as compared to online components (Hanson and Clem, Hoffmann, Owston et.al, 2004). In contrast to this, some viewed face to face classroom components as unnecessary and are mostly fit for socialization purposes. Another issue is of technological skills required by the learner. Blended learning makes learners responsible for their learning. It requires support & training in technological skills (Morgan, 2002). Whereas Bonk & Graham, 2003 concluded that the role of live interactions, learner choices & self-regulation, supporting training models, cultural adaptations & digital divides are some of the issues or concerns in blending. In-country like India the digital divide, professional development/competencies of instructors, and cultural adaptation can be the major challenge in adopting blended learning systems. Apart from these challenges, it is sure that the future belongs to blended learning (Kumar, 2016). So, an open, flexible and holistic approach is again required to implement blended learning systems. This approach is challenging but with an infinite number of practical solutions.

In the Indian context, many educators viewed blended learning as the use of technology in education. They forget that it is not technology/computers but the pedagogy used with technology that impacts the learning process. The blended instruction is different from technology-rich instruction. Technology-rich instruction involved the features of traditional teacher-centric instruction with technological enrichments like e-boards, digital textbooks, online lesson plans, Google Docs, etc. These technological tools can enhance learning experiences, but may not make them learner-centric. Simple use of a technical tool doesn't create a transformative learning experience. Blended learning indeed grows out of teaching that uses technology in a planned and meaningful way. Therefore, the development of a perfect blended learning model resides inside education or social sciences and not in computer sciences. A strong educational philosophy in the form of educational theory is required. The technologist rarely develops an educational technology that has a strong educational and pedagogical base. Educationists find it hard to produce experimental evidence for the effectiveness of any technology. So, at the core of blended learning lies the coherence between technology and educational theory. Hence, the need is to produce a sound educational theory and its relationship with technology.

### 1.1.4 Teaching Effectiveness

The purpose of the study is to develop and standardize CBIP and to explore its effect on the teaching effectiveness of student teachers in the teacher preparation programme. There are different views about teaching effectiveness as people defined it in the way it is conceived and measured. In consensus, highly qualified teachers are highly effective. As a professional requirement, most teachers have the adequate qualification but it does not necessarily predict effective teaching i.e. improved learning in students. So, it is often viewed as a teacher's ability to improve student's learning. This is again a narrow conception as it is one of the important factors of teaching effectiveness but it does not present a comprehensive view of teaching effectiveness.

Passi & Lalitha (1994) identified 14 teaching competencies. These were general teaching competency, teacher concern for students, using A-V aids, professional perception, giving the assignment, pacing while introducing, illustrating with examples, logical exposition, use of questions, classroom management, initiating pupil participation, recognizing attending behavior, use of blackboard, achieving closure. These teaching competencies correspond to the micro-teaching skills. The professional teaching competencies cannot be seen as isolated micro-teaching skills. A teaching competency is a harmonious practice of several micro-skills together forming a unified whole. In 1995, Okgunju linked teaching effectiveness with different school activities and their effect on student's achievement. Dave (1998) in his NCTE document towards effective teacher education highlighted the commitment to the learner, society, profession, achieving excellence, and basic human values as teaching competencies. Kulsum (2001) identified 5 dimensions of teaching effectiveness. These dimensions in the order of their preference are teacher characteristics, classroom management, preparation for teaching & planning, interpersonal relations, and knowledge of the subject matter. In this scale, technological competence was not considered as an important competency. It is observed that standardized scales and NCTE documents gave preferences to the dimensions of teaching effectiveness. Pagani & Seghieri, 2002; Anderson, 2004 concluded that teacher characteristics influence teachers' overall effectiveness. While Anderson (2004) opined that effective teachers achieved the goals they have set for themselves or set by others for them.

The Competency Framework for teachers (2004), Australia emphasized upon professional attributes of a teacher. A teacher must be collaborative, committed, effective communicator, ethical, innovative, inclusive, positive, reflective whereas the American system focused on contextualized performance. It requires teachers to develop lesson plans, self-analysis through video recording, and to collect and evaluate evidence of student learning. The teaching effectiveness framework (2009), Canadian Education Association emphasized 5 principles based on designing instructions, meaningful work assignment for learners, assessment practices, an interdependent relationship, and peer mentoring. Whereas the key elements of Finland's successful education system are effective teacher preparation, professional learning and development, decision-making systems, and curriculum and assessment practices.

Hunt (2009) opined that effective teachers enable their students to think critically, work collaboratively, solve problems, and become effective citizens. Goe, Little, and Bell (2009) conceptualized a five-point comprehensive definition of an effective teacher. They opined that effective teachers are having high expectations for all learners; contribute to positive academic, attitudinal, and social outcomes; use diverse resources in planning and engagement; contribute to the development of classroom and school, and are collaborative with all stakeholders. Darling- Hammond (2010) concluded that effective teachers are intellectually challenging, motivating, set high standards, and encourage self-learning. Okwilagwe and Samual (2011) argued that good teaching practices like the ability to create and adapt to instructional strategy, clarity of expressions, task orientation, creating opportunities for learning leads to teaching effectiveness. Calaguas (2012) listed 6 dimensions viz. professional competence, teaching style, and personality, relational competence with students, classroom management style, and subject matter expertise.

NCF, 2005 encourages teachers to be more sensitive to the emerging demands of society. A teacher should act as a humane facilitator and helps learners in discovering their overall potential and function as contributing members in the society. The teacher should construct knowledge with the help of students. NCFTE, 2010 emphasized that Teacher Training Institutions should develop would-be teachers into Reflective Practitioners. The focus should be on the psychological and professional development of the teachers. They must become an efficient researcher and design instruments of evaluation and assessment. The effective teacher should be more concerned with the process approach to learning in the classroom. An effective teacher must use exemplary teaching strategies and techniques that meet the needs of individual students. Above all s/he must be able to perform all these activities through technology integration. S/he must synchronize ICT & create a balance between traditional & ICT tools inside/outside class; and content, level of students, skillset on one side & updated knowledge, modern competencies on the other.

The vision and mission of NCF (2005), NCFTE (2010), and constructivist viewpoint confirm that a teacher is the most important component in the educational process as s/he creates a remarkable impact in the lives of the students and thus in the whole educational process.

## 1.2 A THEORETICAL FRAMEWORK FOR NEW PARADIGM

Every model requires the formulation of sound & a better theory of instructional designing through valid research design and pre-decided theoretical framework (Yadav, 1989). As instructional designing is both science as well as art, therefore it is essential to consider certain theories and methods; input and output systems to attain specified learning outcomes along with the creative dimension of the designer. As mentioned in the theoretical rationale, the paradigm in context is constructivist, situational, and blended. Therefore it combines the different pedagogical approaches, modes of delivery, and models of teaching, styles of learning, and different learning environments in a balanced pragmatic way to make instructional experiences and learning more authentic & efficient.

In India, efforts were made in the past to integrate various approaches of teaching and learning to better equip to the unique Indian educational situations. Like the cognitive model of learning (Dave, 1972), later its modification into Advanced Curriculum Model of Cognitive-Learning (ACMCL) by Dave in 1976, Nagpal (1983) studied the comparative impact of behaviorist & cognitive approaches and suggested the merger of these two teaching paradigms into one integrated paradigm. Yadav (1989) emphasized the need for formulating a sound & better theory of instructional designing. It is only a matter of time that technology was not having a specified place in this integration at that time. Mishra and Koehler (2006) proposed a TPACK (Technological Pedagogical Content Knowledge) model, Bhat & Kumar (2011) developed Activity Based Lesson Planning (ABLP) model for teaching primary classes and Kumar (2012) developed a micro-skill on selecting and using blends.

Along with these considerations, the theoretical framework of paradigm is based on sociocultural theory (Vygotsky, 1934), Blooms Models (1954), Individualized Instructional Model (Keller, 1960), 5E Constructivist Model (Robert Byee, 1987), Situated learning theory (Brown, Collins, and Duguid, 1989), Cognitive Apprenticeship Model (CAM) developed by Brown, Collins, and Newman (1989), Dick and Caray Model (2001), Merrill (2002) five principles of instruction, Successive Approximation Model (Allen, 2012), and blended learning systems.

The theoretical rationale of the new paradigm is based on the following assumptions:

1. Knowledge is socially constructed. The world and knowledge co-construct each other.
2. Each child is curious and eager to learn new things through the process of assimilation and accommodation

3. A child's environment, culture, and language play an important role in the construction of new knowledge.
4. Children learn when are confronted with tasks little higher than their present potential. They need challenges.
5. The teacher is not an information provider but s\he is to be seen as a constructor of situations or a facilitator.
6. Technology integration facilitates the teaching-learning process hence improves academic achievement.
7. The blended pedagogies i.e. best from all worlds, traditional face-to-face, and on-line learning environments have the potential to improve performance.
8. Systematic planning & contextual execution of instructional procedures by this paradigm helps in the preparation of prospective teachers professionally.

The development of the paradigm is divided into three phases consisting of theoretical base & designing of paradigm, Development of lesson plans based on a new paradigm for its concretization, and Standardization. These are discussed in detail in the proceeding chapters.

# CHAPTER II

# REVIEW OF LITERATURE

**2.1 REVIEW OF RELATED LITERATURE**

**2.1.1 Reviews related to constructivism**

**2.1.2 Reviews related to instructional designing**

**2.1.3 Reviews related to Blended learning**

**2.1.4 Reviews related to teaching effectiveness**

- **Reviews on measurement of teaching effectiveness of student teachers**

**2.2 CONCEPTUAL FRAMEWORK OF PARADIGM**

**2.3 SIGNIFICANCE OF THE STUDY**

**2.4 STATEMENT OF THE PROBLEM**

**2.5 OPERATIONAL DEFINITIONS**

**2.6 OBJECTIVES**

**2.7 HYPOTHESES**

**2.8 DELIMITATIONS**

# CHAPTER II
# REVIEW OF LITERATURE

This chapter deals with the synthesis and analysis of published research work in the area of constructivism, instructional designing, blended learning, and teaching effectiveness. The review of related literature culminates into the significance, statement, operational definitions, objectives, hypotheses, and delimitations of the present research work.

## 2.1 REVIEW OF RELATED LITERATURE

The review of related literature deals with the analysis of primary and secondary reviews; hence, leading to the identification of research gaps. For the comprehension, the relevant findings, recommendations, and limitations of the previous studies are summarized under the following headings:

- Reviews Related to Constructivism
- Reviews Related to Instructional Designing
- Reviews Related to Blended Learning
- Reviews Related to Teaching Effectiveness

### 2.1.1 Reviews Related to Constructivism

This section of the study presents reviews and reflections on constructivism, the effectiveness of constructivist approaches, and technology integration in constructivism.

Constructivism as a philosophical belief and theory of practice has influenced every aspect of education. Constructivist approaches engage students and support diversity (Gibson & Gibbs, 2006; Shachaf, 2008), create competitive environments, develop problem-solving skills, promote social and communication skills (Hmelo-Silver et al., 2007), promote learning by doing, and build social relationships among learners (Thomas & Brown, 2011). The learning environment based on constructivist principles also have positive effects on critical thinking (Maypole & Davies, 2001); creativity (James et.al, 2010), meta-cognitive skills (Jager, Jansen, & Reezigt, 2005; Lam, 2011), and problem-solving (Wilson, 2010; Bay, Bagceci, & Cetin, 2012).

Kelly (2008), Charif (2010) & Verma (2014) found the significant effect of the constructivist approach on the academic achievement of students in chemistry. Festus & Ekpete (2012), Tabago (2012) concluded that constructivist approaches enhance student's activeness, motivation and develop a more positive attitude towards a particular subject than the traditional approach. Rani and Kumar (2014) in their experimental study found a significant effect of the constructivist 5E approach on the academic achievement of students in Hindi subject.

Though educators around the world have embraced constructivism, several others have developed arguments to criticize constructivist approaches (Alanazi, 2016). Kirschner, Sweller, and Clark (2006) argued that constructivism promotes unguided or minimally guided instructions. In minimal instructions, the students become lost and frustrated (Brown and Campione, 1994; Tuovinen and Sweller, 1999 and Moreno, 2004). Such instructions ignore empirical studies showing that unguided instructions are not effective in the learning environment (Kirschner, Sweller, and Clark (2006). The other critics criticized Piagetian constructivism for ignoring contextual components (Ackermann, 2001) and promoting group thinking over individual thinking (Gupta, 2011) as dominant students control the discussions.

Kumari & Mathur (2014) in their study on constructivist processes in science teaching identified the gap between the perception of secondary school teachers towards constructivism and its implementation in real classrooms. The data were collected through a self-constructed perception scale and interview schedule from Kendriya Vidyalayas, Government schools, autonomous schools, and private schools of Rajasthan. They opined that although constructivism is favored, its application inside the classrooms is not widespread and systematic. The secondary school teachers have positive perceptions towards constructivist processes and they challenge the students to explore the world of knowledge for themselves. But they still need to understand their patterns and processes, classroom environment, and role of students in constructivist processes.

Most of the teachers failed to translate the constructivist learning beliefs into the theory of teaching and in creating a free collaborative learning environment.

Despite such criticisms, constructivism still dominates the field of education. Hmelo-Silver et al. (2007) argued that constructivist approaches like inquiry learning and problem-based learning do not lack guidance but provide extensive scaffolding in the learning environment to reduce cognitive load and provide expert guidance. These research results point out that the focus should be more on designing a learning environment. Constructivism suggests that learning environments should be learner-centered knowledge-centered, assessment centered, and community-centered. But, the emergence of new technologies has added another dimension to it, called technology-centeredness.

Kanuka & Anderson, 2008 argued that technology as a valuable education tool is transforming education. The communication technologies provide an interactive environment to support instructional methods required to facilitate constructivist principles. So, there is a tremendous focus on integrating technology in the classrooms. Researches around the world opined that the adaption of new ICTs is at a very slow pace & teachers are using ICT to make their classroom practices easy & quick (Tyack and Cuban 2000; Harris, Mishra and Koehler 2009).

Culp, Honey, and Mandinach (2003) and Russell, O'Dwyer, Bebell, and Tao (2007) found that teachers are using ICT regularly as a value add to their practices and not for transforming their teaching and learning practices. The purpose of technology integration is to enhance the learning in students and achieve all learning outcomes effectively. But the integration was not as desired. So, the focus shifted to find out the problems in the harmonious integration of ICT in classroom practices.

Web 2.0 tools like Wikis, blogs, and other social media has the potential to provide constructive learning opportunities for learners which can support inquiry, creativity, critical reflection, and dialogue. With technology (synchronous and asynchronous) integration in constructivism, a teacher can develop Higher Order Thinking skills like critical thinking, problem-solving, decision making, argumentation, reasoning skills, and creativity, among learners (Ali and Mishra, 2014).

Kapoor (2014) conducted an exploratory study on the role of technology in parental involvement in school practices. A self-developed questionnaire consisting of both open and closed-ended questions was used to collect data from both parents and teachers. It was found that schools are investing in websites, parental calling, and connect to schools with the home of learners. Technology enables the parents to view children's reports, attendance, and assessment scores online. But this is one-way communication where teachers inform parents. The parents mostly prefer to call (75%) and rarely check websites. They generally assess websites to download assignments of students (75%) or checking holiday schedules (60%). The study further suggested that schools should train parents in technology uses and encourage communications through the use of e-mails and discussion boards.

Nasrin and Varshney (2014) explored the perceptions of prospective teachers of Aligarh Muslim University towards learning with social networking websites. It was found that prospective teachers perceived social networking websites like discussion forums, Facebook, YouTube, Wikis, Blogs, Flickr, Twitter, and LinkedIn as effective tools for learning. No significant differences were found in perception based on gender, educational qualification, and time spent on these sites.

The previous researches pointed that there are several barriers in the integration of technology like; lack of resources, no proper training, lack of time, resistance to change, the belief & attitude of teachers (Gill and Dalgarno,2008 and Orlando, 2009). Zhao et. al 2002 classified these factors as innovator (teacher), innovation & context. Elaborating further, Groff and Mouza (2008) noted six factors which are legislative factors, district/school level factors, factors associated with the teacher, project, students, and technology itself. Kumari (2014) opined that the best advantage of ICT to our schools is their qualitative and quantitative improvement and in the enhancement of their productivity and efficiency. But in Indian schools, there are certain barriers like lack of power supply, lack of confidence and competency among teachers, and attitude of teachers and students towards ICT, which offset the advantages of ICT or create hindrances in its implementation.

To find the solution, the emphasis was put on training teachers in technological skills. But still, problems remain the same. The considerations to content, context, and pedagogy are also required alongside training teachers in technological pedagogical content knowledge.

Several studies support constructivist approaches in face two face learning environments. But it is not clear whether these strategies can work effectively in an online learning environment or not. The proceeding section presents empirical reviews related to the technological integration in the teaching-learning process. The technology integration in constructivism can also be called techno-constructivism or digital constructivism.

Tuckman (2002) in his study on the effectiveness of Active Discovery And Participation thru Technology (a hybrid model called ADAPT) on student's academic performance in terms of their grade point average combined the features of both traditional classroom instructions and computer-mediated instructions. A total of 452 students were enrolled for a 10-week course, in which the instructional conditions were organized at three levels; course taught using ADAPT, using conventional classroom instruction, and not taking the course. The performance activities like self-surveys, quick practices, assignments, applications, spot quizzes, online discussions along portfolio assessments were executed in the ADAPT version of the course. The result revealed a highly significant main effect of instructional conditions. Further, the post hoc analysis revealed that the ADAPT version of the course is more effective (average GPA is 3.00) than the conventional classroom version (average GPA is 2.76), and both these versions are significantly more effective than no version (average GPA is 2.52). The study also highlighted the concept of true hybridity. At the course level, both types of instructions occur at different times and in different places. But to achieve true hybridity at the instructional level both forms of instructions need to join together in both time and place.

Hernandez-Ramos (2005) in their survey on technology use in K-12 schools found that in addition to technological factors, contextual and personality factors also play a very important role in technology integration decisions and applications. The beliefs and attitudes of pre-service teachers towards new technologies and computers are essential in technology integration. The support of a model teacher in practice and implementation is a much-needed pre-requisite for technology integration.

Gulbahar (2008) conducted mixed research on improving the technology integration skills of prospective teachers through practice. The study was conducted on 114 prospective teachers from Mathematics, Biology, and Chemistry background. The prospective teachers were enrolled in a course on instructional technology for developing teachers' technological skills and their capacity to integrate technology into the curriculum. The first two weeks comprised of orientation and introduction about technology integration, three weeks of lesson preparation, by the end of 12th-week lessons were revised and technology-rich lessons were produced, last two weeks comprised of evaluations. In the process, the prospective teachers were observed for 9 weeks. The data were collected and analyzed through quantitative and qualitative measures. It was found that with long interventions, prospective teachers not only increased their skill of technology integration but also demonstrate incorporation of changes in technology uses in their lesson planning & delivery. The mathematics group had some difficulties in technology integration than Biology and Chemistry groups. The study further revealed that 87% of the prospective teachers opined to continue the use of technology in their future classrooms. In contrast to these findings, some research findings indicate that pre-service teachers are not ready to integrate technology into teaching practice or learning processes (Doering, Hughes & Huffman, 2003; Wang, Ertmer & Newby, 2004) and the vision, skills, knowledge, and departmental culture are the barriers in the integration of technology into teachers' education courses (Finley and Hartman, 2004). Similar to these findings, Koh, Chai, and Tsai (2010), while analyzing the profile of 1185 pre-service teachers using the TPACK survey concluded that pre-service teachers integrated technology in their lesson plans but in actual implementation in classes they faced issues like lack of time and reserving technology for their classes.

Li and Ma (2010) conducted a meta-analysis of 46 studies on the influence of computer technology on mathematics achievement in K-12 classrooms. It was concluded that computer technology promotes achievement in elementary students in Mathematics as compared to secondary school students. The special needs students also showed significant achievement in Mathematics as compared to general education students. The meta-analysis further concluded that the effect of technology was even higher when the constructivist approach was incorporated in the teaching and learning process.

Wang, Ke, Wu, & Hsu (2011) conducted an action research study on the use of blogs, MS PowerPoint, and the Internet as learning tools in 6th-grade science classes for Project-Based Learning (PBL). PBL is a constructive approach, where teachers facilitate the learning in students and students are involved in a constructive inquiry which facilitates knowledge construction among students. The data were collected through observations, questionnaires, student interviews, and informal parent feedback, and student postings on blogs. The study revealed that integration of technology in PBL encourages self-directed explorations, student autonomy in the learning process. It further pointed lack of information literacy among students as they lack information evaluation skills, note-taking, and information synthesis. The study suggested breaking the culture of copy and paste by developing the skills of note-taking and information synthesis among students.

Nordin, Davis & Ariffins (2013) examined the pre-service teacher's use of ICT and subsequent development of TPACK before and after field experience. 107 pre-service teachers from majors English (29), Social Studies (14), Physical Education (24), Arts Education (12), Mathematics (7), and Technology Education (5) were selected for the study. The mean analysis of pre and post-survey showed that pre-service teachers preferred Content Knowledge (CK) more than Technological Knowledge (TK) and also there was an improvement in TPACK as means of all constructs was higher in the post-survey. Further, paired sample t' test analysis revealed that there is significant differences in all the constructs of TPACK.

Lee & Kim (2014) conducted mixed-method research to investigate the effects of TPACK-IDDRR on the TPACK on 20 prospective teachers enrolled in 15 weeks technology integrated course. The data were collected through surveys, lesson plans, observations, and other written records. It was found that prospective teachers used teacher-centric strategies in lesson planning and technology was used to assist teaching only. The technology was not integrated appropriately in lesson plans. Prospective teachers showed a basic understanding of PK, TK, and CK in the introduction and demonstration stages but not the integrated knowledge of TPACK. It was concluded that the disparity of pedagogical content knowledge among prospective teachers is the main cause of these results. So, during technology integration, the knowledge of pedagogy needs to be considered. Further analysis based on results suggested that in the introduction, pre-service teachers should be involved in discussions to create meaning and examples. In the demonstration, after the demonstration by the model teacher, lessons for various subjects need to be developed by prospective teachers. The focus should be on creating diverse TPACK integrated examples.

Ilie (2014) presented a comprehensive review of Gagne's model and subsequent ID models based on it. The analysis concluded that Gagne's model contains teacher, learner, subject matter, and method but it does not give much emphasis on learning context and the teacher–student relationships. It suggested including learning organization and final appreciation as the first and last steps in the original Gagne's nine events of instruction. Learning organization involves building a positive learning context before starting the lesson through a positive teacher-student relationship. Final Appreciation involves organized feedback to assist both teachers and learners. As per the revised model, Learning Organization, Informing the Learner of the Objective, and Final Appreciation were considered essential for every teaching activity. A non-experimental study was conducted to empirically test the effectiveness of these events on the teaching effectiveness of prospective teachers. It was found that prospective teachers using the revised instructional model showed more teaching effectiveness than those who do not include these events.

Chen, Jang & Chen (2014) proposed a Wiki-based TPACK model considering PCK as PCKCs (Pedagogical Content Knowledge in Contexts) and TCK as TPCKC (Technological Content Knowledge in Contexts). They believed Wikis has great potential to transform learning and instruction by scaffolding personal and social constructivism. They conducted a study on 9 science pre-service teachers through four phases; preparation and orientation, pedagogy and teaching, wiki and application, and collaboration and integration. The results revealed that science teachers developed creative instructional strategies through the use of wikis, made abstract concepts readily comprehensible to learners. They collaborate through wikis and share perspectives with others through group interactions.

Quasmi (2014) measured the effects of ICT based teaching in geography on the achievement of secondary school students. The self-developed lesson plans incorporating animations, images, and videos were used to teach geography to both public and private school students. It was found that the performance of students taught with ICT based lesson plans was significantly higher than those taught with the traditional lecture cum demonstration method. With regards to types of school, no significant differences were found in performances of public and private school students taught through ICT-based lessons; although the mean achievement scores of private school students were found slightly higher than their public counterparts.

Jimoyiannis et al. (2016) developed TPACK Web 2.0 model to integrate web 2.0 tools in instructions for training 31 pre-service teachers in the teacher preparation course. They used a blended learning approach combining both face two face approach and Web 2.0 platforms for 5 weeks. In Web platforms, the online discussion forum, blogs, WebQuest, e-portfolios, wikis, podcasting, social networking, social media, etc. were used. The findings concluded that the theoretical foundation of the instructional design framework, a balance between theoretical and practical issues, and teachers' engagement and collaborative work were the critical parameters for integrating Web 2.0 tools in instructions. The lack of time, classroom infrastructure, and the restrictions set by the national curriculum were the main challenges encountered in applying Web 2.0 into practice. Tondeur et al. (2019) conducted mixed-method research to explore the effectiveness of the SQD- strategies on Technological Pedagogical Content Knowledge (TPACK) of pre-service teachers. They surveyed 688 final-year pre-service teachers from 20 Teacher Training Institutes. The six SQD-strategies were role models, reflection, instructional design, collaboration, authentic experiences, and feedback. These strategies were used to develop technological pedagogical content knowledge (TPACK) among pre-service teachers. A significant positive relationship was found between pre-service teachers' TPACK and their perceptions of the SQD-strategies even after controlling their general ICT attitudes. The relationship between SQD and TPACK was found to be significantly stronger than that between SQD and TK. These results showed an emphasis on an integrated approach (content, pedagogy, and technology) to develop TPACK. The qualitative results revealed that the model use of ICT by teacher educators was an important factor for enhancing future teachers' TPACK. The study recommended that teacher educators should be provided with professional development to infuse TPACK in their practice.

## Conclusion

Despite some criticisms raised by objectivists, the constructivist approaches still dominate the field of education including planning, implementation, assessment & evaluations. The empirical research findings support constructivism as it promotes learning, enhances social relations, develops critical thinking, creativity, problem-solving, and improves academic performances. It results in holistic development; cognitive, affective, and psychomotor. Some researchers worked on integrating objectivist and constructivist approaches and developed integrated models of teaching. In recent time, the advancements in ICT and its uses in education has influenced the constructivist epistemology. The technology integration in constructivism has transformed the constructivist into techno-constructivists, and constructivism into techno-constructivism or digital/virtual constructivism. There is an emphasis to use constructivist principles in synchronous and asynchronous environments. The technology integration in constructivism has a significant effect on the Higher Order Thinking Skills and teaching effectiveness of student teachers; and academic achievement of learners in Chemistry, Maths, Biology, Sciences, and Geography. The student teachers perceived technological tools as effective tools but there are gaps in the theory and practice of these tools in actual classrooms. The lack of resources, no proper training, lack of time, resistance to change, the belief & attitude of school teachers is some of the barriers to implementing ICT effectively in classrooms. The research findings suggested that teachers need to train in technological skills and students require strong scaffolding and training in information synthesis. The TEIs have the responsibility to train prospective teachers in integrating technology in lesson planning, implementation, and assessment. At the same time, importance should be given to content, context, and pedagogy to decide the technology to be used in teaching-learning processes.

## 2.1.2 Reviews Related to Instructional Designing

This section presents the description and critical analysis of various Instructional Design Models (ID Models) along with the learning theories, instructional events, and principles which has influenced the Instructional Designing (ID) process. The primary purpose of reviewing instructional design modals is to establish that such models are not new and with time, many new models emerged by dwelling on the strengths and weaknesses of previous models. So, thematic reviews are presented for understanding the frameworks of different ID models. In addition to this, the researcher feels that such a continuum of analysis helps in finding the research gaps, elaboration of the theoretical framework, and further designing the practical framework for a new paradigm.

**Instructional Designing in Pre Service Teacher Education Programmes**

In pre-service teacher education programmes, the prospective teachers are trained in preparing composite lesson plans in different pedagogy subjects based on various approaches like behaviorism, cognitivism, and constructivism. Most of the institutions follow the Herbartian Approach/Model to instructional designing (based on behavioristic ideas of Johann Herbert, 1776-1841 which were later synthesized by his supporters in the early 20th century) and it has dominated the field of instruction development till the end of 20th century. It consists of five steps; preparation, presentation, comparison & association, generalizing, and application.

The comparison & association stage of the model corresponds to the early form of constructivism. In the contemporary world, although many researchers do not seem to be influenced by this model yet it remains the first best attempt in instructional designing. Some institutions also trained prospective teachers in preparing a lesson based on Dewey's reflective instructional model (1930s). The model includes steps; sensing a perplexing situation, clarifying the problem, formulating a hypothesis, revising the test, and acting on solutions. Apart from this, some of the teacher education institutions also trained prospective teachers in preparing a lesson based on Dewey's reflective instructional model (1930s), Cognitive development model (Jean Piaget), Inquiry training model (Richard Suchmann), Concept attainment model (Jerome Bruner) and Advance organizer model (David Ausubel). These teaching models have 6 components; focus, syntax, social system, the principle of reaction, support system, and application. The syntax constitutes the main working of the model and other components provide guidance and directions in its execution. The philosophical orientation and practice of instruction were based upon principles of Instructivism or sometimes called objectivism. It states that instructional systems need to be well organized and systematic. This is also referred to as a systematic view of instruction development. Instructional designers identify objectives, plan ways to achieve them in the best possible conditions, and evaluate the behavior described in the formulated objective. The constructivists argue that this systematic process is a problem as there is nothing systematic about how we construct knowledge. So, with the emergence of constructivist epistemology in instructional designing, Roger Bybee (1987) developed the BSCS 5E Instructional Model based on Atkins and Karplus's learning cycle (1960). Atkins and Karplus's learning cycle included the terms exploration, invention, and discovery. These terms were modified to exploration, term introduction, and concept application. In the BSCS model, Bybee et al. added the term engagement in the beginning and evaluation as the final phase. So, the five Es of the model are Engagement, Exploration, Explanation, Elaboration, and

Evaluation. Engagement as an activity allows learners to relate their current knowledge to prior knowledge and experiences, stimulate their thinking, and create curiosity in the current concepts. In exploration, learners collect information, investigate, formulate and test hypotheses to make decisions. In explanation, learners demonstrate their conceptual understanding and teachers use reflective activities to clarify their understanding. In the elaboration phase, the teachers challenge the conceptual understanding of learners and create situations to apply it in real-world situations. The evaluation phase encourages learners to assess their understanding and abilities and allows teachers to evaluate learner progress toward attaining the educational objectives. This model specifies the role of teachers and learners in the process of knowledge construction. Most of the Teacher Education Institutions (TEI) favor 5Es approach to lesson planning over other approaches. The emergence of new ICT approaches has added another dimension of technological tools that have transformed the instructional procedures. The educators feel the need for new ID models having harmonious integration of ICT in the constructivist instructional procedures.

**Socio-cultural theory (1934), Situated Cognition Theory (1989), and Cognitive Apprenticeship Model (1989)**

Socio-cultural theory (Vygotsky, 1934) suggested that the social environment plays an important role in the learning process. The language, culture, and Zone of Proximal Development (ZPD) are three central aspects of this theory. The culture is formed of tools and symbols and learners must interact with those tools and symbols to create new experiences. The teachers must create such a culture in the classroom. In a social setting, the learners develop social speech first, then private speech, and then inner speech. It suggests that understanding or development of deep insight takes place in social contexts. ZPD ensures that the learners must be challenged and given instruction at levels higher than their present level. Later Bruner (1976) added the concept of scaffolding to it. Scaffolding is the kind of assistance given to the learner by anyone more knowledgeable or experienced to perform at a level much higher than his present level. The social nature of learning was further emphasized by Situated Cognition Theory (Brown, Collins, and

Duguid in 1989). It claims that learning is a social endeavor. We cannot separate knowing from doing and it is important to apply learned things in clear contexts. All knowledge is situated within activities having a social, physical, and cultural base. So, instructors need to create social, physical, and cultural contexts for learners in the classroom. Dwelling on the ideas of ZPD and scaffolding, Brown, Collins, and Newman (1989) developed Cognitive Apprenticeship Model (CAM) and identified modeling, coaching, scaffolding, articulation, reflection, and exploration as important strategies for contextual learning. It successfully highlighted the role of teacher/mentor/subject experts in the development of cognitive and meta-cognitive skills among learners. These strategies can be successfully used in e-learning contexts. Demonstrations and tutorials on specific e-learning activities can be used in modeling. Videos of experts and screen recording demonstration showing step-by-step procedures help orientate learners before the actual performance. In coaching, the use of chats, discussion forums is helpful as learners also receive feedback from e-facilitators and peers. Scaffolding is helpful in all online social interactions where learners are required to work on a level much above their present skill potential. In articulation, inquiry learning, critical thinking, and thinking out loud activities are useful in a synchronous learning environment but in asynchronous contexts thinking out loud is not effective. In reflection, learners compare their performances with the demonstrations given by experts/facilitators to reflect on their strengths and weaknesses. In exploration, the learner can apply new technologies, to solve problems.

**Bloom Taxonomy (1954), Revised Bloom Taxonomy (2001), and Digital Bloom Taxonomy (2008)**

Benjamin Bloom (1954) developed a model on the taxonomy of learning objectives also known as the Bloom evaluation approach. This approach considered education as an objective-based process in which cognitive, affective and psychomotor learning objectives are designed for all the activities. Formulating educational objectives, creating learning experiences, and evaluating the behavior change are the three main steps of this approach. This approach of lesson planning was highly structured and mechanized and does not provide opportunities for creativity for the teachers. After forty years, Anderson and Karathwohl, former students of Bloom, revisited Bloom's taxonomy and gave Revised Bloom's taxonomy in 2001. The revised levels are remembering, understanding, applying, analyzing evaluating, and creating. As per the Revised Bloom taxonomy, creative thinking is considered a more complex form of thinking. The original Bloom taxonomy is more appropriate at the primary level but the revised Bloom taxonomy is more suitable for planning instructions at the elementary and secondary level. In 2008, Churches created an extension of the original Bloom's taxonomy and called it digital Bloom taxonomy. It extends the categories of revised Bloom taxonomy into the digital learning environment. Laufenberg (2010) asserted that in space of time the information became more widely available and from more sources, and was no longer confined to the physical school building. Similar is the case with Bloom's taxonomy. From 1956 to 2008, the teacher, learner, educational needs, learning contexts, social environments have changed. Bloom's Digital Taxonomy provides the opportunity for different online activities for students, using a variety of digital tools.

**Programmed Instructions (Skinner, 1954)**

Programmed instruction is a highly Individualized instructional procedure in which content is presented in carefully sequenced small steps called frames. In 1954, Skinner identified five central principles of programmed instructional material which are; individualized instruction, self-paced learning, carefully sequenced small steps, making a response, and immediate confirmation of results.

**The Individualized Instructional Model (The Keller Plan), 1960**

The Individualized Instructional Model, also called The Keller Plan or the personal system of instruction, was developed by Keller in the 1960s. It suggested that instructions need to be based upon the educational needs and skills of every learner. It also gave attention to providing effective resources to learners and continuous assessment of learning.

**Gagne's Nine Events (1965) of Instruction and Gagne and Briggs Model (1974)**

In 1965, Robert Gagne gave three domains of learning outcomes, five types of learning outcomes, and nine events of instruction in the conditions of learning, which remain the foundations of instructional design practices. Gagne-Briggs (1974) proposed a prescriptive (integrative) model to create instructions for all the domains of learning and it also describes how to determine the content. The model has three phases comprising of determining objectives, sequence, and creating the external events of learning. Lunzer (1976) remarked about the rapprochement between the Genevan approach (Piaget) & that of new behaviorists (Bloom, Carroll, Gagne & others) for developing a cognitive paradigm.

**Advanced Curriculum Model of Cognitive-Learning (ACMCL), 1976**

In India Dave (1972) worked on a theoretical framework of an integrated approach towards developing a cognitive model of learning. He believed that the most productive approach would be to integrate the best elements of Blooms' model, Flanders (1963-65-70) & Skinner (1954) into one model. This model was adapted for the development of the Bridge Course in Kannada which focused on bringing specific changes in language skill acquisition. Later, he modified this as the Advanced Curriculum Model of Cognitive-Learning (ACMCL) in 1976. ACMCL focused on pre-planned objective-based instructional & evaluation material (textbook and examination-oriented) specially designed for use in teaching. Later, Nagpal (2000) studied the effectiveness of Piagetian -cum - Objective-Based Teaching (OBT) based on ACMCL (integrated paradigm) & the Traditional model on academic achievement of primary students. The significant differences among these three groups in terms of academic attainment and creativity were found among students. The above-mentioned studies highlight the importance of the integration of different approaches to teaching and learning. Keeping in view these developments, Bhat & Kumar (2011) developed Activity-based Lesson Planning (ABLP) model for teaching primary classes. This model was the combination of behaviorism, constructivism (5E's by Bybee, 1954) & Activity Based Learning. Later, realizing the need for integrating technology in the teaching-learning process, Kaur & Kumar (2012) developed a micro-skill on selecting and using blends.

**The ADDIE Model, 1975 and Successive Approximation Model (SAM), 2012**

The ADDIE model (1975) was developed by Florida State University for training purposes. The model contains five phases i.e. Analyze, Design, Develop, Implement, and Evaluation. It is considered as generic model and most of the subsequent instructional design models are based on it. ADDIE model is not an iterative design and follows a linear approach. In present times it is being used in designing e-learning courses but limitations remain the same. Allen (2012) developed the Successive Approximation Model (SAM) as a choice to the ADDIE model. It is an alternative way to integrate technology in small cycles, SAM1 and SAM2. SAM1 is basic and SAM2 is extended form. The successive approximation recognizes that no instruction is going to be perfect in the beginning but perfection can be attained during the process. It encourages collaboration among the different stakeholders and avoids later confusion, called Savvy Start. This aspect of Savvy Start is important in technology-enhanced IDs.

**The Dick and Carey Systems Approach Model (1978)**

Dick and Carey (1978) proposed System Approach Model for instructional designing which viewed instruction as a system in which all components work together to bring desired learning outcomes. The instructor, resources, media, activities, learning contexts, performance, etc. work together and form a system. It starts with the identification of goals of instructions based on instructional analysis and learners' needs, formulating performance objectives, developing assessment instruments and strategies, selecting and developing materials, formative evaluation, revising instruction, and designing and conducting summative evaluations. All steps are interrelated and none can be skipped during the process.

**Morrison, Ross, and Kemp Model (The Kemp Model, 2004)**

The Kemp Model, also known as the Morrison, Ross, and Kemp Model, (Morrison, Ross & Kemp 2004) is a holistic, systemic, flexible, and non-linear (cyclic) model that emphasized the adoption of continuous implementation and evaluation throughout the instructional design process. It consists of nine key elements (phases) to instructional design which include instructional problems, characteristics of learners, task analysis, objectives, content sequencing, instructional strategies, message, delivery, and evaluation. This mode allows designers to start from any phase and to skip phase as per requirement. This model is categorized as classroom-oriented and emphasizes the learner over the content during instructions (Gustafson & Branch, 2002). In this the task analysis stage is similar to stages of the Dick & Carey Model & ADDIE Model, the Instructional Objectives stage is also similar to the first stages of the Dick & Carey Model. Gordon and Zemke (2000) criticized the model for being too slow, not creative, producing bad training, and unattractive to the modern adult learner.

**The Madeline Hunter Method, 1980**

The Madeline Hunter method (1980) is a model of direct instruction, applied to lesson planning. It consists of 8 steps which are anticipation, objectives, purpose, standards input (teaching basic concepts and skills) modeling (show) guided practice monitoring independent practice, and closure. It is similar to behaviorist/cognitivist instructional design models

**Pedagogical Content Knowledge (1986), Technological Pedagogical Content Knowledge (TPACK), 2006, ICT-PACK (2009)**

In the past, content mastery was considered as the only criteria for effective teaching and very little emphasis was given on its transaction. Effective teaching cannot be achieved by simply expert in the field nor solely by possessing certain skills and knowledge of pedagogical practices. It raised a very important question. How teachers adapt their content knowledge into forms that are comprehendible to all learners?

Shulman (1986) recognizes the relationship between content knowledge and pedagogical knowledge and proposed a theoretical framework consisting of **Content Knowledge, Pedagogical Content Knowledge (PCK), and Curricular Knowledge.** Content knowledge includes the understanding of the structure and organization of the content. Curricular knowledge includes the knowledge and understanding of alternative methods and practices for instruction. PCK is a blending of content and pedagogy that gives professional understanding to organize and represent the particular content or problem adapting to the needs, interests, and abilities of learners. He also gave three forms of teacher knowledge viz. propositional, case, and strategic knowledge. He further suggests that when there is a clash between propositional and case knowledge, the strategic knowledge helps the teachers in professional judgments. Although the PCK framework was given in 1986 it still holds considerable relevance today. There is a divide between content and knowledge. The Teacher Education Pragrammes should take lead in building connections between content and knowledge based on empirical evidence gathered from all stakeholders especially, learners. In 1993, Cochran, DeRuiter, and King further extended the concept of PCK and defined it as an integrated understanding of pedagogy, subject matter content, student characteristics, and the environmental context of learning (Cochran et al., 1993),

Dwelling on the ideas of Shulman, Mishra, and Koehler (2006) proposed a TPACK (Technological Pedagogical Content Knowledge) model for understanding teacher's knowledge for efficient integration of technology in teaching and learning. The technology was added to Shulman's (1986) idea of PCK (Pedagogical Content Knowledge) to emphasize the interrelation of content, pedagogy & technology. Over time it has emerged both as a framework and as an instrument to measure TPACK. In this model technology applications directly support the constructivist strategies depending upon the type of learning environment (Roblyer and Doering, 2013). This model consists of seven components in which three circles of Content Knowledge (CK), Pedagogical Knowledge (PK) & Technological Knowledge (TK) overlaps to form three more types of interrelated knowledge i.e. Pedagogical Content Knowledge (PCK), Technological Content Knowledge (TCK), Technological Pedagogical Knowledge (TPK), and all three taken together forming interception as Technological Pedagogical Content Knowledge (TPCK). Technological pedagogical content knowledge (TPACK) is the knowledge required by teachers for integrating technology into their teaching in any content area. The teachers having TPACK employ ICT-based learning strategies, foster scientific inquiry with ICT, support information skills, support student scaffolding, and handle students' technical difficulties. Although it has been used widely yet it lacks the clarity of being a unique body of knowledge (transformative view) or growth in TPACK is the growth in any of the related constituents (integrated view). Because of the overlapping nature of its components, the accurate knowledge categorization is also not clear and it leads to the lack of precision and specificity in the design. It also ignored the role of tools and the involvement of learners in the design process. Angeli and Valanides (2009) revised the TPACK and gave ICT-TPCK model where technology refers to ICT (Information and Communication Technology). They critically reviewed the researches on the TPACK model and concluded that TPACK is not integrative but transformative, a unique body of knowledge. They added two more elements; knowledge of learner's content related difficulties and knowledge of contexts within which learning takes place. So, ICT-TPCK is a synthesis of tools and their affordances, pedagogy, content, learners, and context to understand how complex content can be taught more effectively with the use of ICT. Angeli and Valanides (2007, 2008) used a situative methodology called Technology Mapping (TM) in developing the ICT-TPCK ID model. The steps are given below;

1. Selection of difficult and challenging content domain
2. Identification of topics, relevant content, tentative objectives based on learners conceptions
3. Iterative ID decision process (decision about tool affordances to transform content into powerful representations matching with the needs of learners by applying various pedagogical strategies.

The mapping refers to building connections between various tool affordances, content, and pedagogy. According to Angeli and Valanides (2005), Angeli (2005), Valanides and Angeli (2007) it is important for teacher educators to explain who will use these transformations in the classroom, for what purposes, and why. So, the role of teacher, learner, or the combined role of teacher and learner needs to be defined explicitly in every context.

**The ARCS Model, 1987**

Keller (1987), based on Tolman's and Lewin's expectancy-value theory, proposed The ARCS Model (1987) of Motivational Design with Attention, Relevance, Confidence, and Satisfaction as the main areas. It assumes that the importance or value associated with the knowledge always motivates the people. Hardre (2006) proposes an alternate model Motivating Opportunities Model (MOM) with the acronym 'SUCCESS'; Situational, Utilization, Competence, Content, Emotional, Social, and Systemic as its main elements.

**Hybrid instructional model, 1998**

Marques and Woodbury et.al (1998) proposed a hybrid instructional model for a new teaching paradigm that combines the best elements of classroom and web-based learning environment. The live lectures, classroom, textbooks, library, and offline assignments were used to generate spontaneous immediate feedback, live communication between instructor and students and among students. Some part of the courseware, assignments, communications, and information search was delivered through Internet-based tools. It ensured geographical independence, self-paced learning, and the responsibility for self-learning. By combining these balanced combinations, the best was provided to students. The results show that 73.3% of the students considered themselves too much interested as compared to 46.7% before the course. 66.7% of the students considered e-mail as a useful tool in the learning process.

**The ASSURE Model, 1999**

The ASSURE model was developed by Heinrich and Molenda in 1999. The steps in the ASSURE model are Analysis, Statement of the objectives, Selection of Media, Utilize technology, media & materials, Require Learners Performance, and Evaluate & revise. This model is found more suitable for the blended learning approach as step number 4, Utilize technology, media & materials, provides guidelines for technology integration. It suggested to preview and prepares the technology, media, and materials; prepare the environment and the learners; and provide the learning experiences.

**FutureU ID Model, 1999**

Whitmyer (1999) developed FutureU ID Model for online learning. The model is characterized by 4 phases (Discovery, Design, Development, and Delivery). The model incorporates technology in the design phase. The mode is similar to the generic ADDIE model except that it lacks an evaluation phase. As a convention, the evaluation of online learning is very important but the model missed the evaluation dimension. Moreover, only development and delivery phases are represented in the visual form indicating more importance to these two phases (Mutlu, 2016)

**Merrill's Principles of Instruction (2002)**

Merrill reviewed existing ID theories, models, and researches and synthesized common elements to instruction called Merrill's Principles of Instruction. These are task-centeredness (problem), activation, demonstration, application, and integration. He opined that most effective learning occurs in problem-centered environments and the learner must be involved in activation, demonstration, application, and integration of new knowledge.

**ADAPT Model, 2002**

Tuckman (2002) developed a hybrid model called ADAPT (Active Discovery And Participation thru Technology) which combines the features of traditional classroom instruction and computer-mediated instruction. ADAPT was a blend of objectivist and constructivist approaches. The computer-mediated instructional activities were designed to incorporate modeling, coaching, and scaffolding as a way to support learning in the constructivist learning environment (Jonassen, 1999). Self –pacing and assessments form its regular feature. The traditional classroom features include manual attendance, printed textbooks, and the presence of an instructor. It includes performance activities like self-surveys, quick practices, assignments, applications, spot quizzes, online discussions, portfolios, and paper submissions in the instructional process.

**Situational Instructional Design Model 2002**

Zemke (2002) proposed a situational instructional design model based on the learning theories of Keller, Gagne, Bloom, Merrill, Clark, and Gery. The model consists of five key elements i.e. live events, online content or self-paced learning, collaboration, assessment, and reference materials. In live events, he used Keller's ARCS Model of motivation. In self - paced learning, he emphasized Gagne's nine events of instruction, Merrill's component display theory called situational design theory, and modern instructional design theory by Ruth Clark (2002). He referred to Benjamin Bloom's (1956) model for assessment; and Gagne's retention and transfer for reference material and performance support material of Gery (2000) for generating immediate work performance.

**RCET (Research Center for Educational technology) Constructivist Model, 2005**

Swan (2005) developed a constructivist model, RCET (Research Center for Educational Technology), showing applications of social constructivism in the online learning environment. This model emphasized three interactive dimensions of knowledge construction, viz. representation, conceptualization, and use. The model placed learning at the intersection of these three and explained the mediating effects of technology on each dimension. The representation means external representations of knowledge used in an online environment. The model encourages designers and instructors not only to think about activities and tools which work and not works in an online environment but also to explore their effects on learning. The conceptualizations are similar to the schemas of Piaget. This refers to the ways through which knowledge is reproduced and organized in the human mind and processed and manipulated internally. RCET model asks for a particular technological environment that affords or constrain the conceptualization of knowledge. For example, online learning is supportive in the conceptualization of abstract concepts but less supportive in the conceptualization of procedural knowledge (Parker and Gamino, 2001) and independent learning behavior is more conducive to persistence than dependent ones (Dziuban and Dziuban, 1998). It also suggests that instruction designers should be sensitive to gender and cultural differences also. The third dimension, use, refers to the social activities and social interactions. There is a tremendous effect of digital technologies on the social environment of learners. The social contexts need to be created through a digital environment. So, the RCET model focuses on online social support for knowledge construction & learning and development of social presence among learners, and the creation of more online learning communities.

**TPACK-COPR Model (2010)**

Jang and Chen (2010) revised the Peer Coaching Model of Joyce and Showers (1982, 95) and transformed it into a TPACK-COPR model highlighting its four elements; Comprehension TPACK, Observation of instruction, Practice of instruction, and Reflection on TPACK. In the TPACK-COPR model, the TPACK learning process ends with the stage of reflection. In this model, pre-service teachers were not required to revise their lesson plans after the stages of practice and reflection. They conducted a study on pre-service teachers enrolled in a teacher education course of 15 weeks using the four phases of transformative TPACK-COPR. The results revealed that the observation of model lessons helped prospective teachers in solving instructional problems, the practice provided opportunities to select and transform tools, and they developed skills to integrate technology in the teaching.

Noon (2012) suggested a four-stage model based on teacher efficiency to assimilate instructional technology in a constructivist classroom. The four stages of teacher are Preliterate end-users (having no experience with technology), Software technicians (can use technology for personal use), Electronic traditionalists (proficient in technology use but as an extension to traditional classroom functions), and Techno-constructivists (help children create knowledge through technology). He further suggested that techno-constructivists create collaborative online projects involving students, plan real-life virtual simulations, promote information literacy through online activities, use the internet in lesson planning, and allow the formation of digital communities, discussion forums for enhancing social interactions.

**Ishman-2011 Model**

Ishman (2011) developed a new instructional design model, also called Ishman-2011, based on behaviorism, cognitivism, and constructivism. Behaviorism is reflected in considering the stimulus-response, reinforcement concepts, and environmental conditions; cognitivism is referred to in consideration of motivation, intellectual learning process, experiences, and contents and constructivism can be seen in the roles of both teachers and learners in the process. The goal of this systematic model is to understand how to plan, develop, implement, evaluate, and organize full learning activities effectively. It consists of 5 steps (input, process, output, feedback, and learning) divided into 12 stages.

1. Input
    i. Need identification
    ii. Content identification
    iii. Identify goals-objectives
    iv. Identify methods of teaching
    v. Identify instructional media
2. Process
    i. Test prototypes
    ii. Redesigning of instruction
    iii. Teaching activities
3. Output
    i. Assessment
    ii. Revise instruction
4. Feedback
    i. Go back to relayed subjects
5. Learning
    i. Long term learning

Ishman-2011 shares lots of similarities with the generic ADDIE model. For example, analysis and design of ADDIE are merged into the input of Ishman-2011 but it lacks the development phase of ADDIE (Mutlu, 2016).

**Micro Skill on Developing and Using Blends, 2012**

Kumar (2012) developed a micro skill on developing and using blends for teacher training institutions. The main components of the skill are selection and organization of resources, handling of traditional strategies or resources, handling of online teaching and learning resources, simplicity and appropriateness of blends, sequencing of the content, and involvement of the learner. It was found that the prospective teachers trained in micro skill showed improvement in their technological competencies and school students when taught through blended learning strategies showed a high level of performance. It was further concluded that the technological skills of learners, size of the class, the time duration, the location, and availability of technology are the challenges in developing & executing blends. They recommend that the learners also need to be trained in technological skills.

**TPACK-IDDIRR Model (2014)**

Lee & Kim (2014) developed an instructional design model for pre-service teachers' learning of technological pedagogical content knowledge (TPACK) in multidisciplinary technology integration courses. They analyzed the ID models developed by Angeli, 2005; Angeli and Valanides 2005; Jang and Chen 2010 and also consider the characteristics of a traditional ID model consisting of analysis, design, development, implementation, and evaluation elements and developed a new model called as TPACK-IDDIRR (where IDDIRR stand for Introduce, Demonstrate, Develop, Implement, Reflect, and Revise). In the 1st phase, the introduction, the instructor (teacher educator) introduces the TPACK and its components to the prospective teachers. The 2nd phase, demonstration, deals with the demonstration of TPACK based teaching example to the prospective teachers. The next four phases are carried out by prospective teachers in small simulated group settings and their lessons are video recorded. In these phases, prospective teachers develop TPACK based lessons, deliver them, reflect by reviewing videotape, and revise lesson plans based on their collective reflection.

**Synthesis of Qualitative Evidence (SQD) Model, 2019**

Tondeur et al. (2019) developed the Synthesis of Qualitative Evidence (SQD) model to develop TPACK capacities among pre-service teachers. It consists of necessary conditions required at the institutional level, such as technology planning and leadership, training of staff, access to resources, and cooperation within and between the institutions. It also includes micro-level strategies like using teacher educators as role models (ROL), reflecting on the role of technology in education (REF), learning how to use technology by design (DES), collaboration with peers (COL), scaffolding authentic technology experiences (AUT) and providing continuous feedback (FEE). These strategies were used to prepare pre-service teachers for technological pedagogical content knowledge (TPACK).

## Conclusion

In the process of ID development, the generic ADDIE model (1975) has influenced the development of subsequent models (like Dick & Carey Model, 1978; FutureU ID Model & The Kemp Model, 2004). The researchers improved and improvised the ADDIE model with the changing needs of learners and contexts. The technology integration to generic ADDIE leads to the development of new models (like ASSURE Model, 1999, Successive Approximation Model, 2011 & TPACK-IDDIRR). The socio-cultural theory, Gagne's instructional events, and Merrill's principles of instruction still hold significance in instructional designing. Instructional Designs based on constructivist epistemology (like 5E Model) dominate the instructional procedures in TEIs. With the emergence of ICTs, new models (TPACK, ICT-PACK, RCET, ADAPT were developed through the integration of ICT in constructivism. The focus also shifted towards developing integrated models (Advanced Curriculum Model of Cognitive-Learning (ACMCL), 1976; ARCS Model, 1987; Zemke, 2002 & Ishman, 2011) to combine different pedagogical approaches and learning theories with technology. This integration further led to the emergence of blended instructional designs having elements of both traditional face-to-face and online environments (ASSURE Model, ADAPT, and ICT-PACK).

With the integration of ICT in constructivism, enormous new ID Models have been developed which are effective for their specific subject, place, and contexts. 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 develop ID models suiting to the Indian conditions keeping in view the various challenges originating at teacher education and school education.

### 2.1.3 Reviews Related to Blended Learning

As discussed in chapter-1, blended learning involves the mixing of various online resources and pedagogical approaches in the face-to-face or traditional instructional systems. Researchers around the world have critically reviewed blended learning. Mostly the studies are conducted on perceptions towards blended learning and some researchers tried to analyze its effectiveness as compared to traditional and online learning systems (Guzer & Caner, 2013). This section of reviews presents the analysis of published literature on blended learning and blended learning models to further enrich the conceptual framework of the new paradigm.

Singh (2003) suggested dimensions of appropriate blends for blending offline and online learning; blending self-paced and collaborative learning; blending structured and unstructured learning; blending classroom content with off-the-shelf content; blending learning practices and performance support. He further emphasized that blended learning researches at Stanford University and the University of Tennessee have shown that blended learning is better than traditional methods and individual forms of e-learning. At Stanford University the introduction of live events in self-paced enrichment programs has improved the completion rate up to 94% from the 50%. The University of Tennessee well designed blended learning programs for mid-career doctors were able to demonstrate 10% better learning outcomes than the traditional learning format.

Osguthorpe & Graham (2003) suggested that blended learning should consist of 50% face-to-face classroom activities & 50 % activities from an online environment. Dziuban, Hartman, and Moskel (2004) conducted comparative research among blended learning model, face-2- face and fully online model of instruction at the University of Central Florida. The significant impact of blended learning was found on achievement in students and 88% of faculty members were satisfied with their blended learning courses. This research further emphasized that blended learning initiative requires a planned and well-supported approach, high-quality faculty development, course development assistance, learner support, and creative and authentic assessments.

Ausburn (2004) conducted a study to identify course design elements most valued by adult learners in blended online education environments. It was found that adults valued course designs with options, personalization, self-direction, variety, and learning community.

Garrison & Kanuta (2004) uncovered the transformative potential of blended learning in higher education. It was concluded that blended learning is transforming traditional classrooms and universities. It provided an opportunity for deeper learning. It was suggested that colleges & universities should invest more in blended learning to transform learning.

Rovai & Jordan (2004) studied the effect of traditional, blended, and fully online courses on the sense of community on 68 graduate students. It was found that blended learning courses produced a stronger sense of community among students than traditional and fully online courses. The findings suggest that blended course provides opportunities for students to interact with peers and professors. These courses allow professors to think less about delivering instruction and focus more on producing learning by reaching out to students.

Rosset and Frazee (2006) classified blended learning based on how, what (the content), and where (a face-to-face classroom or online) the activities are organized. Whereas, Graham (2006) suggested four levels of blended learning activities which are Activity level, Course level, Program level, and Institutional level.

Kudrik, Lahn, and Morch (2009) classified blended learning practices into a concept based and collaboration-oriented blended learning strategies. The concept-based blended learning includes online self-training which is self-paced e-learning, and scenario simulation, workgroups, small seminars as part of the face to face collaborative learning. Whereas, collaboration-oriented blended learning includes online computer-supported collaborative learning and face to face individual-oriented conventional classroom instruction.

Korkmaz & Karakus (2009) conducted an experimental study on the impact of the blended learning model on attitudes towards geography course and critical thinking among high school students. It was found that the experimental group (blended learning model) showed a high attitude towards geography and critical thinking dispositions as compared to the control group (traditional learning method).

Ghaith (2009) studied the effect of the blended learning method on students' academic achievement and satisfaction level in a university course for female student teachers. The students studying in the experimental group using blended learning methods through virtual learning environments have shown higher academic performance as compared to students studying face to face alone. However, no significant differences were found between the two groups. The students were satisfied with the teaching method & instructor's support but were not satisfied with the course content.

Singer & Stoicescu (2010) used blended learning as a tool to strengthen teaching competencies in master level teacher training program. The research concluded the process of blending is a difficult one as a large number of peoples are involved (faculty supervisor, prospective teachers, students, school principal, and teachers and parents). The blended learning helped in a deeper understanding of the concepts. The online part enriches the face-2-face components & the responsibility lies with the instructor to decide on the appropriate blends. The live projects from the community brought real & authentic contexts into the learning environment, thus preparing prospective teachers to deal with real classrooms more professionally.

Vernadakis et al. (2012) investigated the impact of traditional and blended instructions on the students´ performance in the early childhood course of physical education. The results of the study revealed that the students of the experimental group treated through blended instructions show higher performance as compared to students in the control group treated through traditional instructions.

Isman, Abanmy, Hussain & Al Saadany (2012) conducted quasi-experimental research with a pre-post test design to explore the effectiveness of the blended learning approach in developing teaching skills among student teachers. The four experimental groups for subjects i.e. Mathematics, Sciences, Computer sciences, and Quran were formed. The experimental groups practiced with a blended learning approach. The observation skill cards were used to observe the student teachers. The results revealed that mean of post-treatment was higher than pre-test showing a significant effect of the blended learning approach in developing teaching skills among student teachers. More than 90% of educators, school teachers, supervisors, and stakeholders perceived planning skills, knowledge of the subject matter, learning strategies, classroom management, and evaluation skills as the most important skills for a teacher.

Yapic & Akbayin (2012) conducted an experimental study to explore the effect of the blended learning model on the achievement of high school students in biology, and on their attitudes towards the internet. The experimental group was taught with a blended learning model and the control group was taught with traditional teaching models. The results revealed significant differences in biology achievement between the two groups. The students taught through the blended learning model showed high achievement and a significant effect on students' attitudes towards the Internet was also found.

Guzer & Caner (2013) conducted an analysis of literature on the past, present, and future of blended learning by reviewing 4445 articles published during 1999-2012. Most studies were conducted on the effectiveness of blended learning on the satisfaction level of faculty & students, the motivation of faculty & students, achievement of students, attitude of students, and cooperativeness among faculty, knowledge retention, critical thinking skills in students, and drop-out rate among students. These studies concluded no significant effect of blended learning on the academic performance of students but significant effects were observed on attitude and knowledge retention, satisfaction, and motivation.

A case study research on blended learning vs traditional learning was conducted by Nazarenko (2015) at Moscow State University. The conclusions are;

- 21st-century specialists require professional competencies like critical thinking ICT skills and information processing skills. These skills should be developed via incorporating technologies in the teaching-learning process.
- The young learners are receptive to new technologies and this has a motivating effect on them in learning new skills.

- The emphasis should be on the right types of blends as these attract the students most.
- The teachers need to be creative and professionals and they have to suggest challenging & interesting activities for students.
- Administrative and policy support is required for using technologies.

Lalima & Lata (2017) in their review article on blended learning as an innovative approach concluded that blended learning can provide solutions to the problems of the Indian Education System. The blended learning needs early adaptation with proper planning & organization to become our future education system. Both in-service & pre-service teacher education programmes need to be oriented towards blended learning approaches. The funds, resources, and efforts that are put into other projects need to be directed towards implementing blended learning in our schools.

Fazal, Panzano & Luk (2019) conducted a mixed study to investigate the impact of blended learning strategies on the academic achievement of 3-8 class students in mathematics. The station rotation blended learning model was adopted to teach mathematics in 44 classrooms in 7 schools. Classroom observations (N=8), teacher interviews (N=8), and student focus group interviews (N=8) were conducted along with the ratings of principals on 5 point rating scale on implementation of blended learning strategies. The results revealed a significant positive effect of blended learning practices on the achievement of students in mathematics. The qualitative analysis revealed that teacher-led instructions are still supreme and online digital content in blended learning practices cannot replace the role of teachers. Blended learning creates technological challenges for both teachers and students and hence, adaptation is required.

## Conclusion

It can be concluded that in the beginning, the focus was mostly on perception studies on blended learning, which got shifted towards the types of blends and levels of blends. The process of blending is a difficult one as a large number of peoples are involved (faculty supervisor, prospective teachers, students, school principal and teachers, and parents). So, it requires proper planning and organization. At present, the focus of the researcher is on experimental studies to ascertain the effectiveness of blended learning on the academic achievement of students. The blended learning practices improve the academic achievement of students and at the same time improve the teaching skills and competencies of both pre-service and in-service teachers.

It was found that mostly blended learning researches have been conducted at the institutional, program, and course level and not at the activity level. The focus was on covering some part of program or course in the traditional setting and other online. If the focus is on the harmonious blending of online and traditional sources then studies need to be conducted at an activity level i.e. a simultaneous blend of traditional face-to-face and online environments.

## 2.1.4 Reviews Related to Teaching Effectiveness

The goal of the present study is to develop an instructional paradigm and explore its effects on the teaching effectiveness of student teachers and through the perception of school students. So, teaching effectiveness, as the dependent variable, needs to be reviewed comprehensively. A meta-analysis of 208 studies on teacher effectiveness and related characteristics shows that 53.91% of studies are on teacher-related Characteristics, 35.94% on school-related characteristics, and 10.15% on teaching-related characteristics (Dutta, Heldar and Sen, 2017). So, this section presents reviews on the dimensions of teaching effectiveness and measurement of teaching effectiveness.

**Reviews on Teacher and Teaching Related Dimensions of Teaching Effectiveness**

A teachers' place in any society is most important as s/he helps to keep the lamp of civilization burning from generation to generation (Radhakrishanan Commission, 1948-49). Secondary Education Commission (1952-53) has also given importance to the place of teachers in both school and society with regards to their personal qualities, educational qualifications, and professional training. In support of this, almost all commissions and committees argued for quality training of teachers in teacher training institutes. The initiatives of the past and recent researches support that teachers' quality and teacher effectiveness are two significant factors in improving student learning and achievement

(Darling- Hammond, 2000; Rivkin et al., 2005; Wang & Fwu, 2007 Liakopoulou, 2011; Sadler, Sonnert, Coyle, Smith, & Miller, 2013). The further thematic analysis of relevant reviews on various dimensions of teaching effectiveness is presented in the following section.

**Pedagogical Content Knowledge**

Shulman, 1986; Cochran et. al, 1993; Mishra & Koehler, 2006; Angeli & Valanides, 2009 argued that pedagogical content knowledge of teachers is one of the primary factors which decides the related competence of teachers. They opined that effective teaching cannot be achieved by content mastery and knowledge of certain pedagogical skills instead the blending of content and pedagogical knowledge gives professional understanding to plan and execute teaching as per the needs of the students.

**Subject Matter Expertise**

Reyes (2000), Minor et al. (2002), Lacang (2007), Magno and Sembrano (2007) gave importance to subject matter expertise. The indicators like knowledge about the subject matter, well-prepared lessons, an expert, content mastery, ability to teach many subjects indicate the subject matter expertise of a teacher.

**Relational Competence with Students**

Reyes (2000), Magno and Sembrano (2007), Sanchez (2007), and Bustos-Orosa (2008) emphasized Relational Competence with students as one of the important dimensions of teaching effectiveness. It includes traits like maintaining rapport, harmonious relationships, sensitivity, open-mindedness, acceptance, dealing affectionately with students, helping students, believing in students, recognizing the potentials of the student.

**Professional Competence**

Reyes (2000), Minor et al. (2002), Lacang (2007), Magno and Sembrano (2007) considered professional competence as one of the important dimensions. It includes indicators like dedication, morality, passion, integrity, fairness, positive role model, etc.

**Teaching Style of Teachers**

Reyes (2000), Minor et al. (2002), Malikow (2006), Sanchez (2007), and Restubog (2009) considered the Teaching Style of teachers as an important dimension for teaching effectiveness. They described this dimension with indicators such as simple explanations, flexibility, varied instructional style and strategies, student-centeredness, instructional clarity, resource knowledge, values integration, giving homework, encouraging questions and discussions, organized teaching, developing a sense of responsibility among the students, good communication, and making classes interesting.

**Classroom Management Style**

Minor et al. (2002), Sanchez (2007) gave importance to Classroom Management Style with indictors like maintaining students' on task, not yelling at students, modeling positive behaviors, always maintaining discipline, rewarding good behaviors, creating a safe environment.

**Personality**

Malikow (2006), Magno and Sembrano (2007), Sanchez (2007), Akintayo and Iwoye (2008), Bustos-Orosa (2008), Raymond (2008), Restubog (2009) identified personality as one important dimension of teaching effectiveness. It includes indicators like caring, energetic, strong, relaxed, practical, kind, compassionate, bold, aggressive, an extrovert, active, predictable, reasonable, gracious, wise, decisive, charismatic, sense of humor, stable, creative, respectful, friendly, reflective, rational, challenging, enthusiastic, the concern of students' successes, good prior academic performance.

**Communication**

Andrew, Cobb & Giampietro (2005) in their logical analysis suggested that educators should take verbal ability (communication ability) into account, but due to the wide range of scores among good to excellent teachers, it is inadvisable to use single measures of verbal ability to measure or predict teacher effectiveness.

**Technological Competence**

Tuckman, 2002; Mishra & Koehler, 2006; Angeli & Valanides, 2007 & 2009; Jang & Chen, 2010; Kumar, 2012; Lee & Kim, 2014 and Tondeur et al, 2019 gave importance to the technological skills of the teachers. It is the knowledge required by teachers to integrate technology into their teaching-learning process. It includes handling both synchronous as well as non-synchronous technology.

**Teaching Aptitude and Attitude towards Teaching**

Palardy & Rumberger, (2008); Liakopoulou, (2011); Kanti, (2011); Sharma, (2012); Kumar, (2013); Sadler, Sonnert, Coyle, Smith & Miller (2013); Hussainmiya & Naik (2015) considered that attitude towards teaching is an important trait of a teacher. Ghatvisave (2012); Manu &Yellappa (2013); Kumar (2013); Seetharaman & Rajasekar (2013); Chandel & Dhiman (2014); Kaur, Singh, & Sangha (2014) considered teaching aptitude as a most basic person related variable which even impacts all other independent variables of teaching effectiveness. Kaur, Singh & Sangha (2014) conducted a study on 100 prospective science teachers and concluded that teaching aptitude and attitude towards teaching predicts the teaching competency of teachers. Contrary to these results, Malik and Sindhu explored the relationship between teaching aptitude and teaching competency of 600 B.Ed. student teachers in Haryana and concluded that teaching aptitude and teaching competence are independent of each other. The literature shows conflicting and contradictory results in these dimensions.

**Academic disciplines**

Shishavan & Sadeghi (2009); Parikh (2012); Fouche (2013); Tyagi (2013); Pama, Dulla& Leon (2013) studied the teaching effectiveness of teachers concerning their academic disciplines. Parikh (2012) found a statistically significant difference whereas Pama, Dulla, & Leon (2013) found insignificant differences in teaching effectiveness of teachers with respect to academic discipline.

**Sense of humor**

Askildson (2005); Shiyab (2009), Ashipaoloye (2013), Bala (2016) considered humor as one of the important traits of teachers. It is fundamental to classroom teaching. The humor aids in classroom engagements by creating a positive and social environment which creates psychological bonding between teacher and students. Shiyab (2009), while studying pedagogical effects of humor in teaching opined that it breaks the culture of seriousness and rigidness in the classroom. Ashipaoloye (2013) while analyzing the perception of science graduates on the effect of humor on teaching and classroom relationships found that 90% of respondents from age group 15-20 years gave strong preferences for the integration of humor in teaching but students' grades have no significant relationship with the sense of humor of teachers. Bala (2016) opined that humor transforms the teacher from an authoritarian to a facilitator. In her review research, she gave cautions to separate humor from sarcasm and suggested guidelines for appropriate use of humor in educational settings.

## Conclusion

The thematic analysis of reviews shows that researchers have studied various teacher and teaching-related variables or dimensions. Content mastery, personality, aptitude, attitude towards teaching, and classroom management seem to be basic dimensions that affect the teaching of a teacher. The recent advancements in ICT applications in education have shifted the focus towards the technological competence of teachers. Most of the studies conducted in the recent past are on measuring Technological Pedagogical Content knowledge of teachers (TPACK). The critical analysis of the literature suggests that TPACK alone cannot predict the overall teaching effectiveness of the teachers. Technological competence as a tool is an important dimension of teaching effectiveness that impacts the pedagogy but the pedagogical content knowledge still holds the central position in the teaching-learning process. It is the pedagogy that decides the type of technology to be used in the process. The sense of humor is another important dimension that has attracted the attention of researchers but more empirical results are required to prove its significance in teaching effectiveness.

The reviews pointed that the basic dimensions of teaching and the most sought dimension of teaching i.e. technological dimension, have been studied separately and hence, cannot predict the overall teaching effectiveness of teachers/prospective teachers. Moreover, there is also a dearth of studies concerning the impact of teachers' training and lesson planning on teaching effectiveness. Although the results of the studies are contradictory and conflicting, the thematic analysis helps decide the relevant dimensions of teaching effectiveness and in developing the Teaching Effectiveness Scale for prospective teachers and perception scale for learners.

**Reviews on Measurement of Teaching Effectiveness of Student Teachers**

Historically, student ratings were considered as the primary measure of teaching effectiveness. Rajesh & Rajesh (2000) opined that students' rating of teacher serves as a source of diagnostic feedback for both faculty & students. This can be used as a measure in the promotion decisions of teachers and students can also use this information in the selection of courses. Das and Borah (2003), while conducting a study on evolving a sound feedback mechanism for effective teaching found that 88% of teachers perceived student feedback as a very poor measure and 12% of teachers considered it as satisfactory. But contrary to these results, Emery, Kramer, & Tian, 2003 found that the student ratings are the chief measure to evaluate teaching performances.

Knapper & Cranton, 2001; Berk, 2005 stated that the measurement of teaching effectiveness is itself a complex process and it is reasonable to use multiple sources of evidences as they can provide more comprehensive, accurate, and reliable measures. The other advantage of using multiple sources is that the strengths of each source can compensate the weaknesses of others, thereby giving a more accurate picture of teaching (Appling, Naumann, & Berk, 2001).

Mohanty (2003) opined that although there is some subjectivity in students' evaluation of teachers yet it is considerably more objective than any other alternative i.e. self-evaluation, evaluation by peers, or head of the department. He further stated that there are certainly other factors i.e. teachers experience, teacher's sense of accountability, attitude and interest, size of the class, infrastructure, facilities, difficulty level of the subject, students quality, economic conditions, working environment of the institution, nature of the employer-employee relationship, degree of clarity and transparency in the administrative process, political interference, etc. which determine the teacher's sincerity, efficiency, and commitment to his/her profession.

Berk (2005) noted that the models on faculty evaluation (like Romberg, 1985; Soderberg, 1986; Braskamp & Ory, 1994; Keig & Waggoner, 1994; Centra, 1999; Arreola, 2000) put greater emphasis on student and peer inputs and less to self-evaluation, alumni, administrators, and others. He identified and critically reviewed the twelve potential sources to measure teaching effectiveness viz. student ratings, peer ratings, self-evaluation, videos, student interviews, alumni ratings, employer ratings, administrator ratings, teaching scholarship, teaching awards, learning outcome measures, and teaching portfolios. He further concluded that the videos when used with a checklist of behavior showing strengths and weaknesses, and analyzed either alone or with peer inputs are the best evidence for formative measurements. There are three forms of student interviews. These are quality control circles, classroom group interviews, and graduate exit interviews. The classroom group interview is conducted with the entire class by someone other than the instructor of the course.

Darling-Hammond, 2000 and Kupermintz, 2003 suggested that the effectiveness of the teachers is often measured by student achievement. So, teaching effectiveness can be outcome-based and is assessed through student productivity in terms of their academic achievement and employment. There exist significant correlations between student ratings and performance in final exams (Theall and Franklin, 2001). But, there are factors, other than teaching, which may influence the outcome of students (Loeb, Rouse, & Shorris, 2007). The student characteristics, such as age, gender, maturation, ability, attitude, and motivation; and features of the institution, like classroom facilities, size of the class, technology, and learning resources, and school climate, also affect the student performance.

Imig & Imig, (2006) and Loeb et al. (2007) opined that it is very difficult and problematic to measure the teaching effectiveness of individual teachers over time.

Patel & Ansari (2011) said Audio-Video recording has been an important and effective source of feedback in micro-teaching, but unfortunately, these were not used during real classroom practice in schools.

Bala (2012) for her doctoral research analyzed the curriculum content of the teacher education programmes in terms of theory paper, practice teaching, and practical component or work experience. The population of the study comprised of all the teacher educators, student-teachers, and HODs of the ETE programs i.e. 9 DIETs of the NCT of Delhi, private DIETs, faculty of education, Jamia Millia Islamia, and B.El.Ed colleges of the University of Delhi. Practice teaching was found to be the weakest link of teacher preparation with the possibility of becoming stronger if organized properly. It was mentioned that the process of curriculum transaction needs enrichment and improvement. Model demonstration lessons by teacher educators can help in improving classroom performance. Student-teachers said that the feedback or comments given by the teacher educators were helpful. Approximately 30% of student-teachers were not in favor of the comments or feedback being effective.

Napoles & MacLeod (2013) explored the influences of teacher delivery and student progress on the teaching effectiveness of pre service teachers. They found that teacher delivery is the best predictor of overall teaching effectiveness and is followed closely by student progress. Chennat (2014) analyzed the pre-service teacher education system specifically the component of practicum or school experience programme of India, Canada, and Finland to bring improvement in teacher education in India. She discussed the challenges faced by Indian Teacher Education institutes as:

1. There is a mismatch between the perspective and philosophy of schools and TE institutions about the role of the teacher as taught in TEI and as required in schools.
2. Supervision/assessment is also an area of concern during teaching practice. A dearth of time has been found with the supervisor or the teacher educators to guide student-teachers in preparing lesson plans or in supervising their lessons as the number of student-teachers is more. The other concern is the subject expertise of the concerned supervisor as it is the basic requirement in teacher preparation. Pedagogy supports and complements the content delivered, so a supervisor is required to be a subject specialist as well as a pedagogue, a combination not readily available.
3. Another challenge is related to the cooperative teachers or the host teachers in schools. There is a need to involve senior teachers in grooming the student-teachers with their experience. This poses yet another challenge that these teachers see this teaching practice phase as their free time.

4. One major constraint observed was the unavailability of the time in schools - forcing the student-teachers to get directly into the teaching rather than getting accustomed to the school ethos and observation of real classrooms. Similarly, in India, the visible trend is that theory is given more weightage than practice; the same applies to teaching practice.

Nagpal (2000, 2005, and 2015) focused on total quality management of teacher education specifically on pre-service teacher education in India. Practice teaching or school experience programme has been considered the most powerful intervention in the teachers' professional preparation but it has also invited certain criticism. Gaps between theory and practice, no clear cut objectives, insufficient input before the internship, indifferent attitude of supervisors towards the supervision of lessons, and lack of co-operation from collaborating schools are a few defects pointed in the paper. A few suggestions have also been incorporated in the papers which are based on research evidence as remarked by the author. Instructional strategies for teaching practice should be made integral parts of the courses, planning of need-based clear cut lessons, duration of teacher education programmes should be increased, collaborating schools should become a part of the teacher education institutes, duration of field experience shall be increased, and supervision during the field experience should be done by both the school authorities and teacher educators, were the suggestions and if they are seen in today's scenario a few of them have been fulfilled and some need attention till date.

Nagpal (2015) studied the effect of using mobile phones video recording, image capturing and SMS facility on teaching proficiency of student-teachers during the School Experience Programme of an Elementary Teacher Education Institute in Delhi. Student-teachers lessons were video recorded by their peers and were shown to the respective student-teacher and feedback was shared through SMS alongside. The findings showed the availability and familiarity of student-teachers with mobile phones having video recording and SMS facility. The results of this study were found positive and the teaching proficiency of the treatment group increased in comparison to the Control Group. The study indicated that watching one's performance and feedback helps in identifying the problem areas and improving upon them.

Bhatia & Haider (2015) studied the perception of pre-service teachers of B.Ed. (Bachelor of Education) programme of University of Delhi towards the use of WhatsApp mobile application during School Experience Programme. The result indicated WhatsApp as an effective tool for collaboration and supervision. The recommendation pointed out that it should be conducted on a larger sample and across the institution for more reliable results.

In pre-service teacher education, the student teachers are trained in simulated conditions. Every student teacher acts as a teacher, student, and observer. All the three roles of a student-teacher are closely observed by a supervisor and video recorded. So the teaching can be observed by peers, supervisors, and through technological support. For making the observation process more objective, teacher education institutions use evaluation performa. The same practice applies to the real teaching practice in schools but for a certain number of lessons and also without technological support. Student teachers' self-analysis of teaching through videos when supported with peer evaluation and supervisor evaluation serves as an effective source of measuring teaching effectiveness. In some practices, the school subject teachers as mentors are also involved in the process. In pre-service teacher education, although the informal group perceptions of school students are recorded occasionally but not considered as a potential source of teaching effectiveness. The achievements of school students are also not given preference in evaluating the teaching of a student-teacher. These two potential sources of evaluation need to be considered along with other sources like peer and supervisor evaluation.

One of the frequently used quantitative measures to assess the teaching effectiveness of teachers is the use of rating scales. The rating scales mostly used by the researcher in India are General Teaching Competency Scale by Passi & Lalitha (1994) and Teaching Effectiveness Scale by Kulsum (2001). These scales do not give importance to the technological competence of the teachers. Mishra and Koehler (2006) developed a TPACK measurement model to measure the technological competence of the teachers.

TPACK and its modifications (Angeli & Valanides, 2007 & 2009; Tondeur et al. 2019) cannot measure the teaching effectiveness alone. So, there is an urgency to develop new quantitative tools to measure teaching effectiveness.

## Conclusion

The analysis of reviews shows that researchers favored students' rating on teaching as students observed teachers live in the classroom. While some of the studies opined that students are immature and do not have the required understanding of teaching skills, therefore, cannot evaluate teachers. In these situations, it is imperative to use multiple sources to measure teaching effectiveness. The technology has added other important sources like; WhatApp, video recordings, text messaging, image capturing, to measure the teaching of student teachers. The institutional-based self-developed rubrics or rating scales are also used to measure teaching effectiveness. The researchers at the national level concluded that there is a mismatch between the perspective and philosophy of schools and TE institutions about the role of the teacher as taught in TEI and as required in schools. The gaps between theory and practice, indifferent attitude of supervisors towards the supervision of lessons, and lack of co-operation from collaborating schools are a few issues that impede the measurement of the teaching of student teachers.

This suggested that the teacher educators, student teachers, school subject teachers, learners, and management, and parents should be involved in measuring teaching effectiveness. The informal group discussions with learners and their academic achievement should also be considered as potential sources of measurement. So, quantitative and qualitative measures along with technological support should be used for more comprehensive, accurate, and reliable measures. Moreover, instead of emphasizing a combination of sources, more focus is required on designing, executing, and reporting accurate results.

## 2.2 CONCEPTUAL FRAMEWORK OF PARADIGM

From the above discussion, it is clear that efforts have been made in the past to integrate various approaches of teaching and learning to better equip to the unique Indian educational situations. It is only a matter of time that technology was not having a specified place in the integration at that time. But in present times, the overemphasis on technology is also ruining the essence of education. So, the development of this paradigm is balanced & harmonious blend of different pedagogical approaches, learning theories, and technologies. The critical analysis of reviews guides the researcher to conclude that;

1. The teaching-learning process is a harmonious integrated and holistic process that cannot be based on any one single approach. The integration of best from all approaches is required to enhance the achievement of learners and the teaching effectiveness of teachers.
2. In paradigm, the emphasis is on planning, implementation, and evaluation. The focus on planning is to ensure the error-free implementation of the paradigm. In implementation and evaluation, more emphasis is on innovative strategies.
3. The paradigm is systematic but not linear as the emphasis is on the concept of the spiral approach.
4. The focus is to develop the overall teaching effectiveness of student teachers and not on technological competence only. Technological competence is one dimension of TE and technology is a tool like other tools in the teaching-learning process.
5. The paradigm put more emphasis on assessments (assessment for, as & of learning) to give more time on reflections on the part of teachers and students.

**The theoretical framework of CBIP**

1. The design of the paradigm consists of 5 components (Basic teaching model by Glaser, 1962) focus, syntax, and social system, the principle of reaction, support system, and application.
2. The syntax of the paradigm constitutes the planning phase, implementation phase, and evaluation phase

**The design of the new paradigm is divided into three phases:**

**Phase I:** A theoretical base & designing of paradigm

**Phase II:** Development of lesson plans based on CBIP for the concretization

**Phase III:** Standardization of CBIP

1. The design part of the paradigm consists of six components; focus, syntax, and social system, the principle of reaction, support system, and application (based on the Basic teaching model by Glaser, 1962).
2. The syntax of the paradigm constitutes the planning phase, implementation phase, and evaluation phase.

I. P**lanning Phase**

1. Analyzing subject matter prescribed in the textbook
2. Identifying the instructional goals & conducting need analysis
3. Analyzing the entering behavior of the learners
4. Formulation of instructional objectives
5. Sequencing & organization of subject matter
6. Decision making about teaching-learning strategy
7. Deciding about the teaching-learning resources
8. Development of teaching-learning strategy & blends
9. Development of formative & summative assessment strategies

II. **Implementation Phase**

i. Learning organization
ii. Presentation of the puzzling problem or events
iii. Formulation of hypotheses (Exploring solutions)
iv. Verification of hypothesis
v. Formulation of explanations
vi. Increasing critical awareness
vii. Assessment of understanding & reflections

**III. Evaluation Phase**

## 2.3 SIGNIFICANCE OF THE STUDY

As the new theories are emerging every day & knowledge is expanding very fast, there was a consensus growing among educators that there is no best pedagogy that can solve most of the problems of education. Many educators, researchers around the globe feel that blended learning has the potential to solve the problems of education. Blended learning is the type of learning which involves the mixing of various online resources and pedagogical approaches in a face to face or traditional instructional system. Specifically, it is a blend of all forms of technology, learning theories & approaches in instruction to provide all possible experiences to a learner. But the major challenge, which emerged, is that the instructional design approaches developed and used till date are merely based on behaviorism or constructivism, and technology has no place in their development. The educators and teachers on their own have integrated technology in these approaches without setting assumptions or guidelines. The fully online courses also emerged in the early 21st century but these were mostly used in distance education and do not get fit in traditional classrooms.

Moreover, the emergence of new approaches, pedagogies, technologies, and theories is recommending entirely new models of teaching and learning. An important implication of this transformation or shift is the need for creating an ideal learning environment for students to employ appropriate pedagogies and technologies. Therefore, there is a need to develop a new instructional model to provide a strong base to the student teacher and learners for effective teaching and learning. The purpose is to create new knowledge, a new theory, and develop blends of traditional and online approaches suitable for Indian schools.

The younger generation is the digital generation; the technological competence seems to be innate to them. In the classroom, learners are more comfortable or sometimes more proficient in using technical gadgets as compared to their mentors. Technological innovations are occurring at very high speed and digital technologies are fast becoming an integral part of our daily life. So, the need is to train teachers in effective technological skills. The teachers or instructors around the world are using technology at their ease. The mere use of PowerPoint presentations is not blending at all. Blending at any level requires more advanced skill sets.

At present time blending models exist at four different levels; activity level, course level, program level, and institutional level. Blending at activity (instructional) level ensuring attainment of each objective through appropriate blend has not been focused yet. In near future, the question will not be whether the learning system blends or not but the question of paramount importance will be how to blend. The researcher himself after visiting more than 100 secondary schools and teacher education institutions (both private and government) in Punjab, Haryana, Delhi & Himachal Pradesh, as part of professional collaborations (workshops, training, etc.), found that the current instructional procedure is mostly focused on the transmission of information and are not interactive. In the current scenario, the world needs independent thinkers, critical thinkers, and problem solvers. Such teacher-centric instructional procedures cannot develop our learners into critical thinkers. So, the problem is with ineffective pedagogical practices or insufficient preparations of prospective teachers. The need of the time is improved pedagogy which needs to be child directed and interactive. Across the world blended learning pedagogy has improved pedagogy by improving active learning strategies, peer learning strategies and learner cantered strategies. Besides these, blended learning strategies also increase decision-making skills. So by developing a blended paradigm, the researcher intends to improve the pedagogical richness in prospective teachers which in turn will develop required skills in the learners.

The other problem in the Indian Education system is a large investment and low return on investment. In India, the share of GDP in education is 2.7% which is below the Global GDP share, which is around 6%. India being a developing country, cannot afford the high cost of education. So, such systems are required which can solve the problems of large investment and results in high returns. The training procedures through blended learning in the corporate world like in IBM & Microsoft haves resulted in high-cost effectiveness. Blended learning systems have increased accessibility to the masses in a short period. It saves huge investments in terms of human resources, physical infrastructure, & time. The high-cost effectiveness, with low investments and large returns on investments, was also found in education. The main focus of the research is to reduce the cost at the classroom level. The researcher intends to develop this model to reduce the cost of education in the Indian education system thereby, finding the solution to the problem of high investments and low returns.

Traditional approaches confirm that teacher is responsible for bringing learning in the students. Whereas, blended learning approaches motivate students to assume responsibility for their learning. So, there is a transformative shift in responsibilities for learning from teacher to student. In a Blended Learning environment, the learner has to explore & learn by self. So, Blended Learning prepares students for their responsibility and accountability in the learning process.

The Teacher Education Institutions have a very important role to play in improving the system of education by training, educating, and inspiring the future student teachers. A teacher requires understanding and mastery of pedagogical, communication, and technological skills, etc. to make his/her classroom interactive. For this purpose, the exercise of instructional designing or lesson planning becomes very essential. Although innovative lesson plans based on Cognitive learning, Constructivism, Modular planning, Inquiry-based learning, Critical Thinking, Collaborative Learning, Cooperative Learning, etc. are introduced in the field of teacher education yet there is a need to make it entirely learner cantered and constructive in nature. In the past, mostly the researches were conducted on constructivist models, blended models, behaviorist and hybrid models as separate models or in comparison with the traditional model. The model which is based on the constructivist approach incorporating blended learning practices has not been developed and explored yet. Moreover, the effectiveness of the developed models has been established with the academic achievement of students and not with the teaching effectiveness of student teachers.

The purpose is to design the instructions based upon the particular situation, resources, and content and to solve the educational problems by realizing the need for constructive pedagogy. This model will help teachers to adopt the role of facilitator and learner to construct new knowledge. It can apply to all the school subjects as the selection of blends entirely depends on the expertise of the teacher in a particular subject. This will overcome the limitation of other instructional models which are mainly suitable for specific subjects. It will ensure equality in educational opportunities for all whether studying in any type of school or any area. The online resources lessen the knowledge divide and provide access to all resources. The distance or geographical divide will not remain a problem for learners. It will solve the problems of the Indian Education System by providing universal access and equality in educational opportunities in the true sense.

Teacher educators are finding it hard to conclude which instructional design of lesson plan format is most suitable for a particular subject. Moreover, there is a large gap found between teacher education and school education. The researchers at the national level concluded that there is a mismatch between the perspective and philosophy of schools and Teacher Education Institutions (TEI) about the role of the teacher as taught in TEI and as required in schools. There is a mismatch in the content and context of training in TEI and its execution in classrooms. For example, the lesson planning in which student teachers were trained at TEI is not even practiced in real classrooms. The formats, procedures adopted at schools are altogether different from TEIs. Hence, the development of CBIP will consider the lesson planning procedures used in schools and the focus will be on training student teachers with the same. It will enable all the teachers to use it according to their area of expertise. In this sense, this model is of immense importance for educational institutions and school education and will greatly influence the world of training and instruction at the national level. In due course, it will also guide the administrative and policy planning at the national and institutional level.

## 2.4 STATEMENT OF THE PROBLEM

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. So, the researcher intended to mix technology with constructivism and develop a new blended instructional paradigm. In view of this, the statement of the study is '**Effectiveness of Constructivist Blended Instructional Paradigm'.**

## 2.5 OPERATIONAL DEFINITIONS

### Constructivist Blended Instructional Paradigm (CBIP)

The 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.

### Constructivism

For this study, constructivism means digital or virtual constructivism, which is the integration of ICT in constructivism. The learner with his/her varied experiences interacts with the learning environment and creates multiple realities to understand central critical concepts within the curriculum. Here, the learning environment is learner-centered knowledge-centered, assessment-centered, community-centered, and technology-centered.

### Blended Learning

Blended learning is the type of learning which involves the mixing of various online resources, pedagogical approaches in the face-to-face or traditional instructional system. Specifically, it is a blend of all forms of technology, learning theories & approaches in instruction to provide all possible experiences to a learner. In this study, blended strategies involved the rotation model, use of mobile in and out of class for educational purposes, use of laptops/computers for showing images, videos, and animations, use of the internet for live streaming of videos, consulting Wikis, blogs, online quizzes, and online expert lectures. Equal emphasis was given to both traditional and online resources.

**Instructional Paradigm**

Instructional paradigm is a systematic and sequential procedure of organizing instructional experiences. It is a sort of guidelines, plans or techniques, or strategies designed to achieve some specific educational objectives.

**Teaching Effectiveness**

Teaching effectiveness is the measure of quality teaching which corresponds to the improved teaching competencies in student teachers and academic achievement in learners.

**Student Teachers**

Student teachers are the B.Ed. students pursuing B.Ed. and B.Ed.-M.Ed. degree in the teacher education institutions.

**Competence**

Competence is complex coordination and integration of knowledge, skills, competencies, and values.

## 2.6 OBJECTIVES

**The objectives of the study were**

1. To develop a Constructivist Blended Instructional Paradigm.
2. To explore the effect of constructivist blended instructional paradigm on teaching effectiveness of student teachers in teacher preparation.
3. To assess the effectiveness of the developed paradigm in teaching skills or competencies of student teachers through the perception of school students.

## 2.7 HYPOTHESES

**The hypotheses of the study were**

1. There exists no effect of constructivist blended instructional paradigm on teaching effectiveness of student teachers in teacher preparation.
2. There exists a significant effect of the developed paradigm in teaching skills or competencies of student teachers through the perception of school students.

## 2.8 DELIMITATIONS

**The delimitations of the study were;**

1. The study was delimited to English, Hindi, Mathematics, Social Science & Science subjects. Other pedagogy subjects like Punjabi, Economics, Commerce, and Physical Education were not considered.
2. The study was delimited to one Teacher Education Institute and 18 secondary schools of the Doaba region of Punjab, India.
3. The study was delimited to blended strategies at the activity level only. The blending strategies at course, programme, and institution levels were not considered.
4. Blended learning strategies were delimited to the affordable resources so mostly executed with laptops and mobiles.
5. The effect of CBIP was seen on the academic achievement of students with respect to selected subjects only. The type of school, class, and examination board was not taken into consideration.

# CHAPTER III

# METHODOLOGY

# CHAPTER III

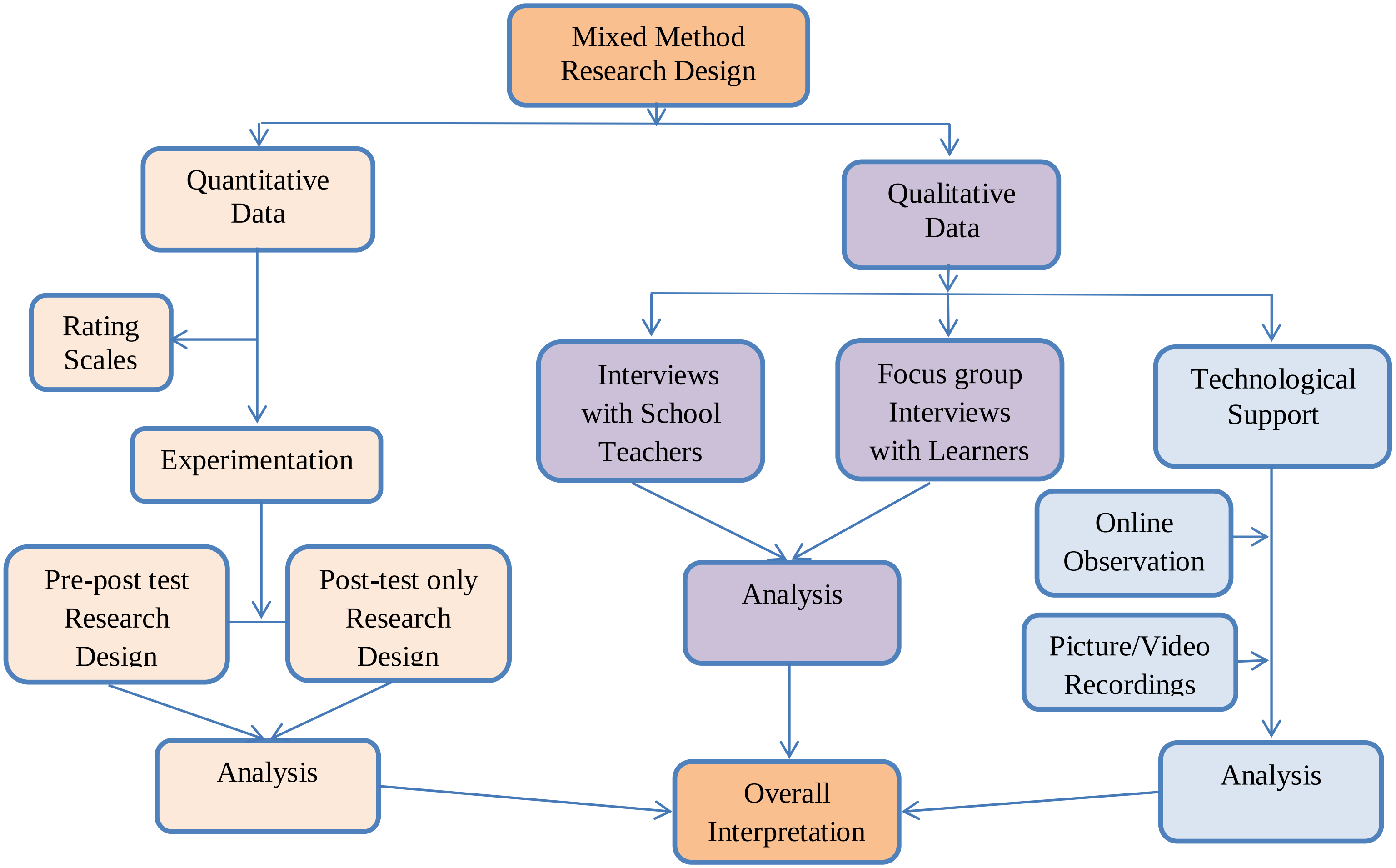
# METHODOLOGY

The present study intended to develop the Constructivist Blended Instructional Paradigm (CBIP) and explore its effects on the teaching effectiveness of student teachers in the Teacher Education Institutions (TEI) and academic achievement of learners in schools. The study also envisioned to ascertain the efficacy of CBIP through the perception of learners and cooperative teachers regarding teaching competencies of student teachers. Hence, teacher education and school education were considered as a continuum in which student teachers were trained in TEI to teach learners in schools through CBIP based lesson plans during the internship programme. So, the sample of the study comprised of B.Ed. student teachers, learners of the schools, and school teachers. Therefore, the study is complex and multilevel. Hence, the development, standardization, and evaluation of CBIP required appropriate scientific methods, tools, and statistical procedures. The present chapter deals with the justification of research methods and designs, sample, tools, the procedure of data collection, and statistical techniques used in the study.

## 3.1 RESEARCH METHOD

The study used a mixed-method research approach. It involved the collection & analysis of quantitative and qualitative data. The quantitative data were collected through rating scales and experimentation; qualitative data were collected through focus group discussions & interviews, and in technological assistance, data were captured through pictures and videos. In a nutshell, it was fixed mixed-method research using rating scales, experimentation, interviews, focus group discussions, picture and video recording (figure 3.1). The research intended to illustrate quantitative outcomes with qualitative findings and synthesize a complete understanding of the effectiveness of CBIP. So, the convergent parallel research design (also called concurrent triangulation) was used.

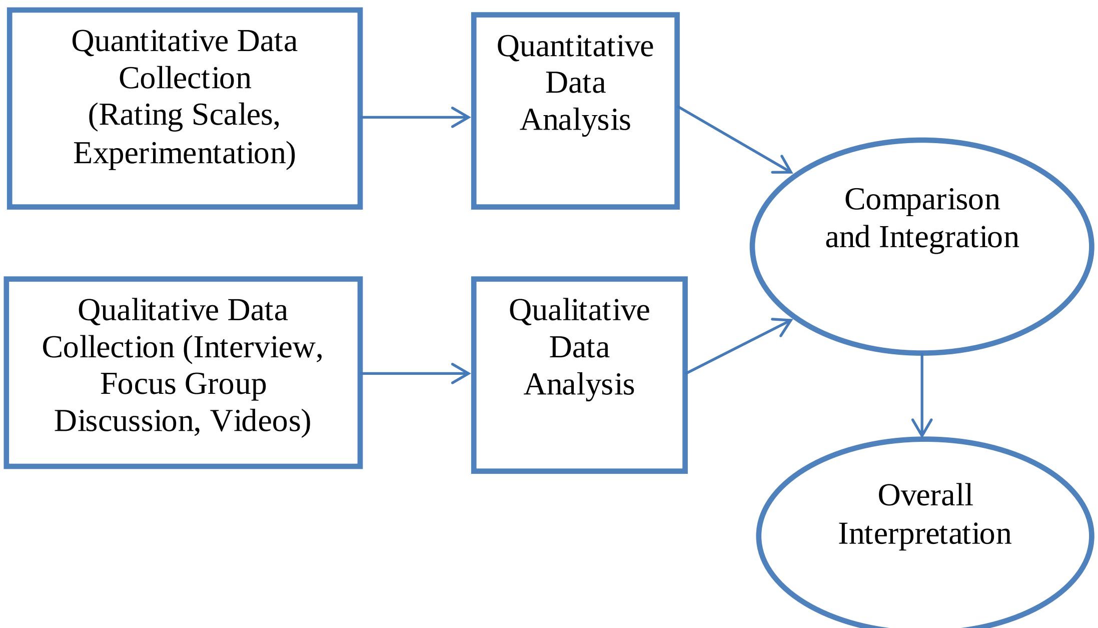
**Figure 3.1**
**Mixed Method Research Design**



The quantitative and qualitative data collection and analysis were concurrent but separate and independent and given equal priority. The results of experimentation, observations, interviews, focus group discussions and video analysis were integrated and compared with each other during the overall discussion and interpretation (figure 3.2).

**Figure 3.2**

**Convergent Parallel Research Design**




The empirical pieces of evidence through experimentation were used to estimate the impact of CBIP on the teaching effectiveness of student teachers without their random assignment. The student teachers were selected based on their level of teaching effectiveness (Through scale) and they delivered CBIP based lesson plans to the experimental group. So, a quasi-experimental method with a pre-posttest research design was used to collect quantitative data to ascertain the effectiveness of CBIP on the teaching effectiveness of student teachers (see figure 3.3). In addition to pre and post observations of student teachers, three additional observations were recorded. All five observations were periodical to determine the role of feedback, exercise, and experience with respect to time on the teaching of student teachers. After each observation, remedial feedback in the form of specific inputs was given to student teachers (figure 3.4)

**Figure 3.3**

**Pre-Post Research Design (Teaching Effectiveness)**

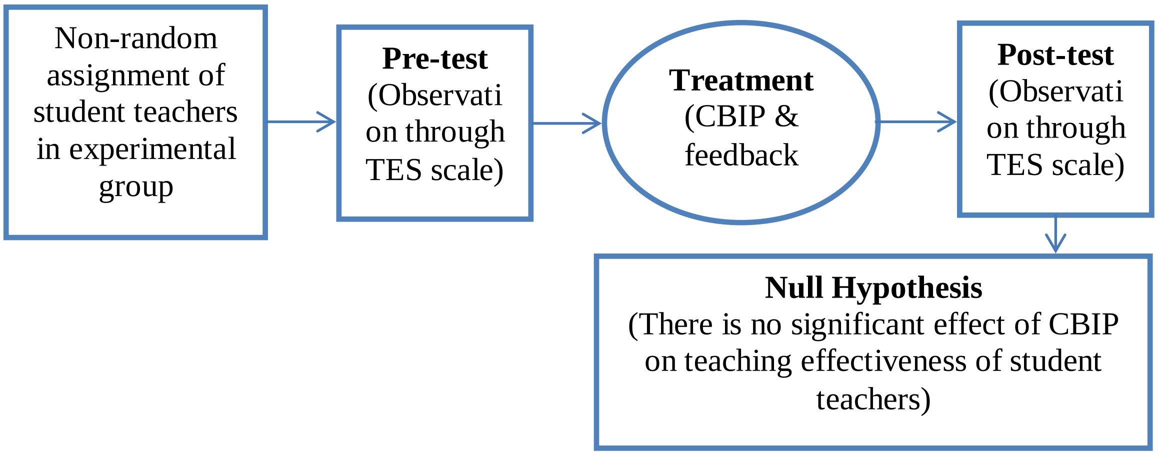
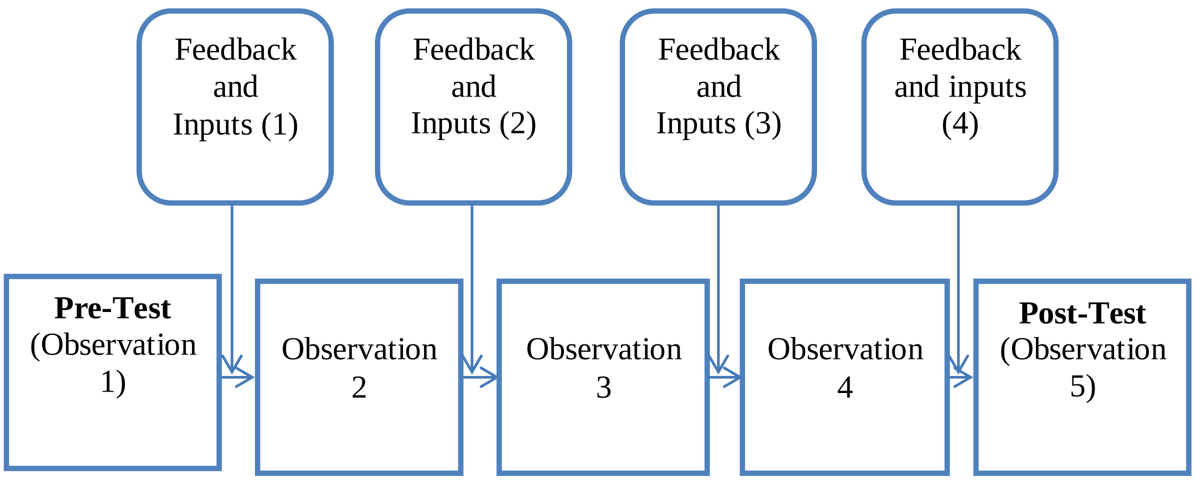



**Figure 3.4: Pre-Post Research Design (with Periodic Observations)**




The pre-post test design was used to study the effect of CBIP treatment on the academic achievement of learners of the experimental group (figure 3.5). During the internship, the different classes/grades were having two or more sections (groups). These sections were used as experimental and control groups with a minimum shuffling of learners based on their previous academic records. So, the post-test-only research design was used to see the impact of CBIP on the academic performances of the learners. The significant difference between the means of post-tests of experimental and control groups was calculated in all five subjects (figure 3.6).

**Figure 3.5**

**Pre-Post Research Design (Academic Achievement)**

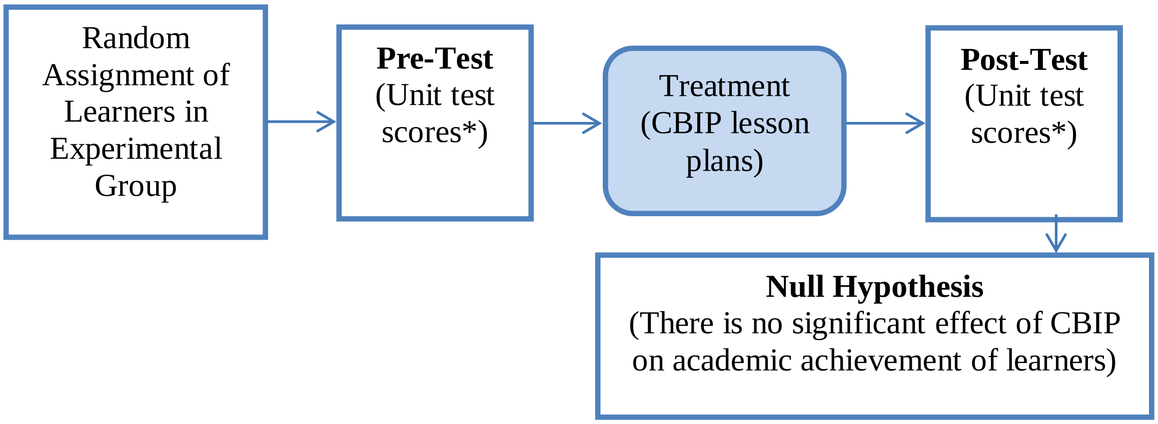
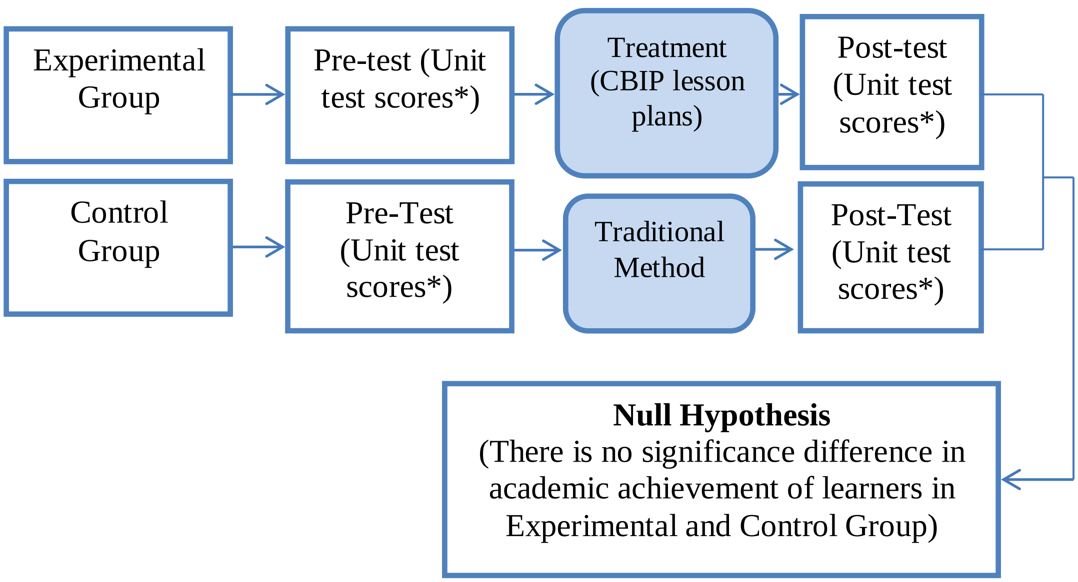



**Figure 3.6**

**Post-test Only Research Design (Academic Achievement)**



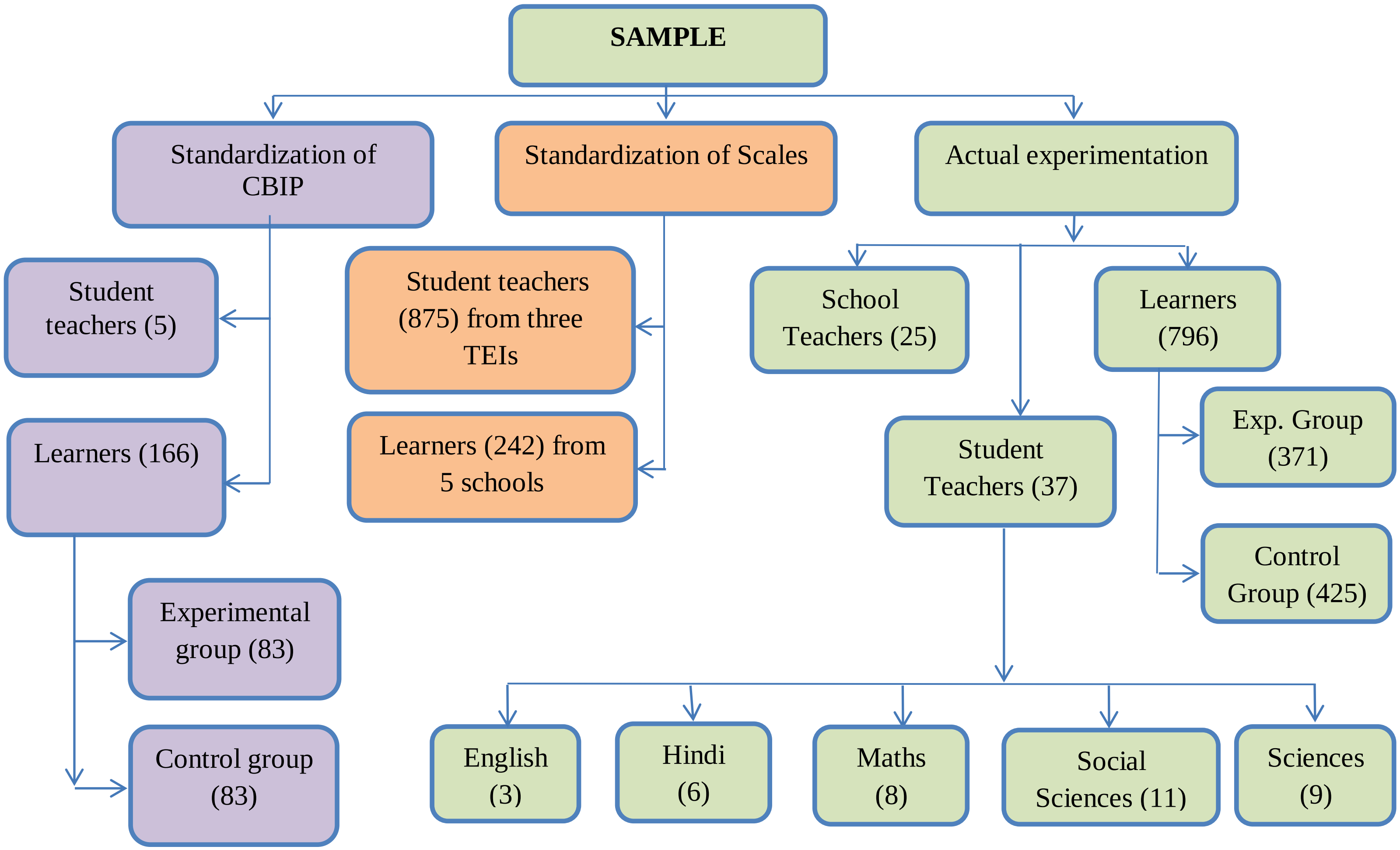

*test conducted by school under CCE practices

## 3.2 SAMPLE

It was consisted of student teachers, school teachers and learners. The number of student teachers and learners varies with the objectives. Figure 3.7 shows the graphical representation of sample.

**Figure: 3.7**

**Distribution of sample**



### 3.2.1 Sample for standardization of CBIP

It comprised of 5 student teachers (one each from Science, English, Hindi, Social Science & Mathematics) and 166 school students from 6th, 7th & 9th grades through convenience sampling. The students were distributed in two groups i.e. experimental & control group having 83 students in each group.

### 3.2.2 Sample for Standardization of Scales

It consisted of 875 student teachers from three different institutions of education from sessions 2016-17 & 2017-18 to standardize TES scale and 242 learners from 5 schools to standardize the perception scale towards teaching effectiveness for learners.

### 3.2.3 Sample for Actual Experimentation

For actual experimentation, the population of the study comprised of student teachers and school students of 6th to 10th grades studying in 18 secondary schools of the Doaba region of Punjab, India. The B.Ed. student teachers having the above-average level of teaching effectiveness were considered for the experimentation. So, 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 institution of the Doaba region of Punjab, India. As the main focus was on developing teaching competencies among student teachers, therefore, the schools which were allotted to selected students during their teaching internship were selected for experimentation, and simultaneously due considerations were given to the availability or creation of just equitable infrastructural facilities in the schools. In all the schools, equitable technological resources were created. The mobiles and the laptops of the student teachers were used during the teaching-learning process in experimental groups. For using the rotation model of blended learning, the use of minimum of three laptops was made compulsory. In this manner, all school students were provided with access to similar kinds of technological resources.

Further, it was made sure that no other student-teacher under experiment, belonging to any other subject under experimentation, is teaching the same class. At the school level, 796 learners of grades 6th -10th 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. Another sample at the school level included 25 school teachers or principals who acted as mentors to student teachers and observed them informally in the classes.

## 3.3 TOOLS

As discussed in review of literature, General Teaching Competency Scale (GTCS) by Passi & Lalitha (1994) and Kulsum Teacher Effectiveness Scale (KTES, 2001) were mostly used by researchers in the past. The fourteen teaching competencies discussed by Passi & Lalitha (1994) correspond to different micro teaching skills. Since, a teaching competency is a harmonious combination and practice of several micro teaching skills taken together therefore; the professional teaching competencies cannot be seen as isolated micro teaching skills. KTES has not considered technological competence as an important teaching competency. Whereas, Mishra & Kohlar (2006) in their measurement model on TPACK has overemphasized the technological competence. As the new paradigm was based on constructivist blended learning practices, the available scales were not suitable to measure its effectiveness. Moreover, to support quantitative results, the study also required qualitative data from principals and learners which is highly contextual. Considering these contexts, researcher developed following tools:

1. Lesson Plans based on Constructivist Blended Instructional Paradigm
2. Teaching Effectiveness Scale for Student Teachers
3. Student Perception Scale towards teaching
4. Interview Schedule for School Principal/Subject Teacher
5. Interview Schedule for Learners

### 3.3.1 Construction of Tools

After analysis of the available literature, focus group discussions with the experts at local and national level, the detailed plan for the pilot study was prepared. The step by step procedure guided the development of following tools;

1. Development of Constructivist Blended Instructional Paradigm
2. Lesson Plans based on Constructivist Blended Instructional Paradigm
3. Teaching Effectiveness Scale (TES) for Student teachers
4. Student Perception Scale towards Teaching
5. Standardization of Constructivist Blended Instructional Paradigm
6. Interview Schedule for School Principal/Subject Teacher
7. Interview Schedule for Learners

The detailed description of tools construction is given below:

**3.3.1.1 Development of Constructivist Blended Instructional Paradigm**

As per the thematic analysis of Instructional Design Models (in chapter 2) following conclusions were derived;

1. The generic ADDIE model (1975) has influenced the development of subsequent models like Dick & Carey Model, 1978; FutureU ID Model & The Kemp Model, 2004. The researchers improved and improvised ADDIE model with the changing needs of learners and contexts. The technology integration in to generic ADDIE led to the development of new models like ASSURE Model, 1999, Successive Approximation Model, 2011 & TPACK-IDDIRR.
2. The sociocultural theory, Gagne's instructional events, and Merrill's principles of instruction still significant in instructional designing systems.
3. The Instructional Designs based on behaviorist approach (Harbertian Model) and constructivist epistemologies (like 5E Model) dominate the instructional procedures in TEIs. With the emergence of ICTs, new models like TPACK, ICT-PACK, RCET, ADAPT etc. were developed through integration of ICT in constructivism.
4. The focus also shifted towards developing the integrated models like Advanced Curriculum Model of Cognitive-Learning (ACMCL), 1976; ARCS Model, 1987; Situational Instructional Design Model (Zemke, 2002); & Ishman-2011 Model, to combine different pedagogical approaches and learning theories with technology.

5. The integration approach in ID development further led to the emergence of blended instructional designs having elements of both traditional face-two-face and online environments like ASSURE Model, ADAPT and ICT-PACK.

The thematic conclusions pointed that efforts have been made in the past to integrate technology but the resultant models were mostly used in distance learning systems or providing instructions at programme or course level. The learners covered some part of programme or course through offline and some part through online systems. It does not correspond to blending at instructional level. Therefore, the CBIP was the harmonious blend of all pedagogical approaches (behaviourism, cognitivism and constructivism), media, methods and technology in a balanced, pragmatic and justified manner. The emphasis was to draw the best from all these approaches as per the Indian context & circumstances. In this instructional model, knowledge was created situationally, keeping in view the readily available resources (both offline and online) along with the prescribed text book content. In this way, it was blending of traditionalism and modernism, a harmonious practical combination of East & West. It was supposed to create sequential procedure of instructional experiences to make learning more authentic & efficient. The conceptual framework of the paradigm was discussed with the experts at local and national level along with the format of lesson planning and Teaching Effectiveness Scale. These discussions were done for holistic understanding of the whole research and better coordination between different elements of the study. The following suggestions were given by the experts

1. Develop model blended strategies
2. Consider Digital Bloom taxonomy in developing objectives.
3. Plan traditional and online resources separately in lessons.
4. Make Learning organization a part of lesson plan
5. Include PISA considerations in evaluation.
6. Theoretically model is perfect and shows blending of constructivism with technology. Apply integrated approaches in evaluation also (as discussed in theory of model).

7. Syntax of model is fine. Keep Indian conditions in considerations.
8. Revise point 3 (Analyzing entry behavior) and 4 (Formulating instructional objectives). Make these steps more constructivist like plan constructivist strategies, define role of teachers and students.
9. Rename steps in lesson plan and give original steps as per theory of model.

The suggestions given by the experts were considered while developing the CBIP. The development process of paradigm was completed in three stages as;

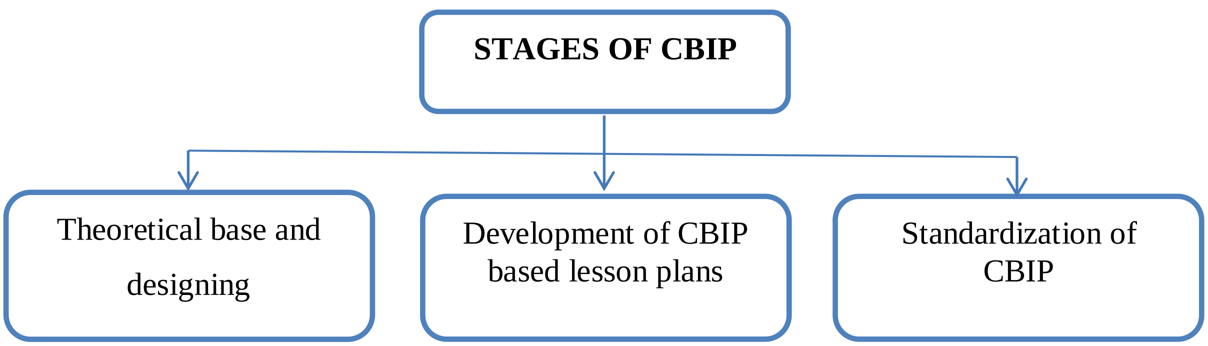
**I:** Theoretical base & designing of paradigm

**II:** Development of lesson plans based on CBIP for the purpose of concretization

**III:** Standardization of CBIP

**Figure 3.8**

**Developmental Stages of CBIP**




**Stage I: A theoretical base & designing of paradigm**

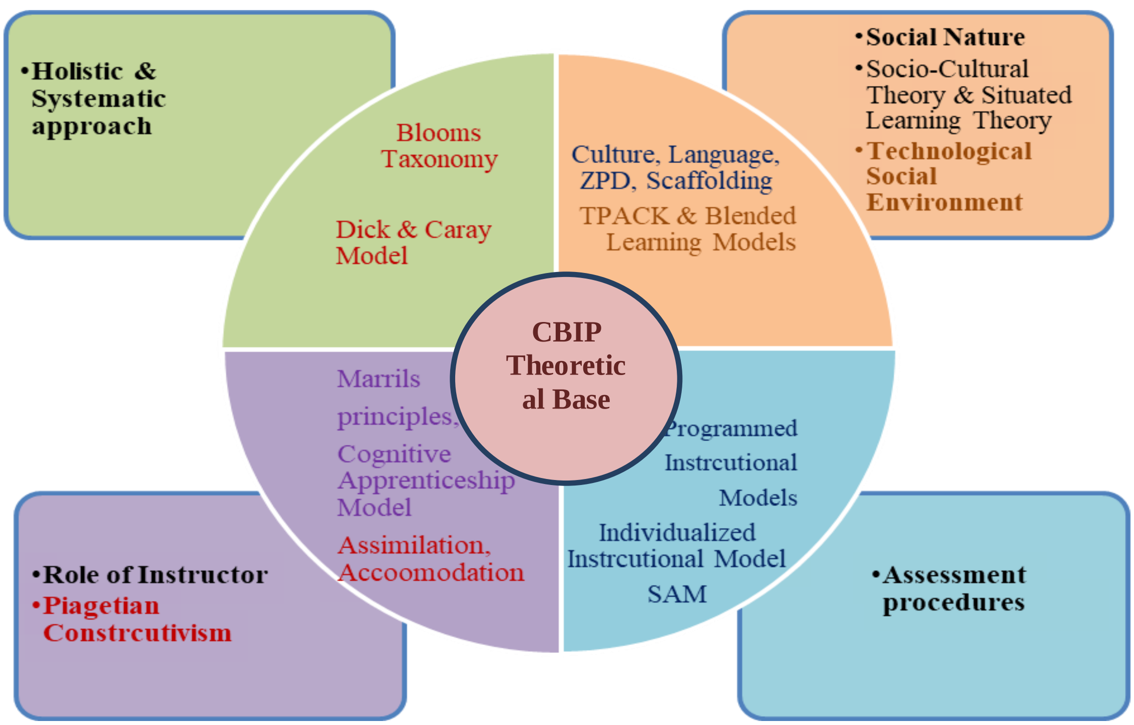
**A. Development of theoretical base**

The theoretical base of the paradigm (Figure 3.9) was developed after critical analysis of existing instructional models as follow;

- The social nature of model from socio-cultural theory and situated learning theory.
- Role of previous knowledge, assimilation and accommodation from Piagetian constructivism.
- Holistic approach to instructional design from Blooms models (including revised and digital Blooms taxonomy).

- Technological social environment or technology integration from TPACK and blended learning models.
- The importance of culture, language and Zone of Proximal development (ZPD) and scaffolding continuum from socio-cultural theory.
- The role of instructor from both Cognitive Apprenticeship Model and Merrill principles;
- Systematic planning from Gagne's Nine events and Dick and Caray Model;
- The assessment features from individualized instructional model, the instructions in small steps from Programme learning and Successive Approximation Model (SAM).

**Figure 3.9: Theoretical Rationale of CBIP**




So, the development of this paradigm was a balanced & harmonious blend of different pedagogical approaches, learning theories and technologies. In this sense this paradigm could be rightly called as Constructivist Blended Instructional Paradigm (CBIP).

The harmonious blending of various approaches, theories and technology integration led to the emergence of certain principles for the CBIP which were framed in terms of its theoretical rationale are as follow;

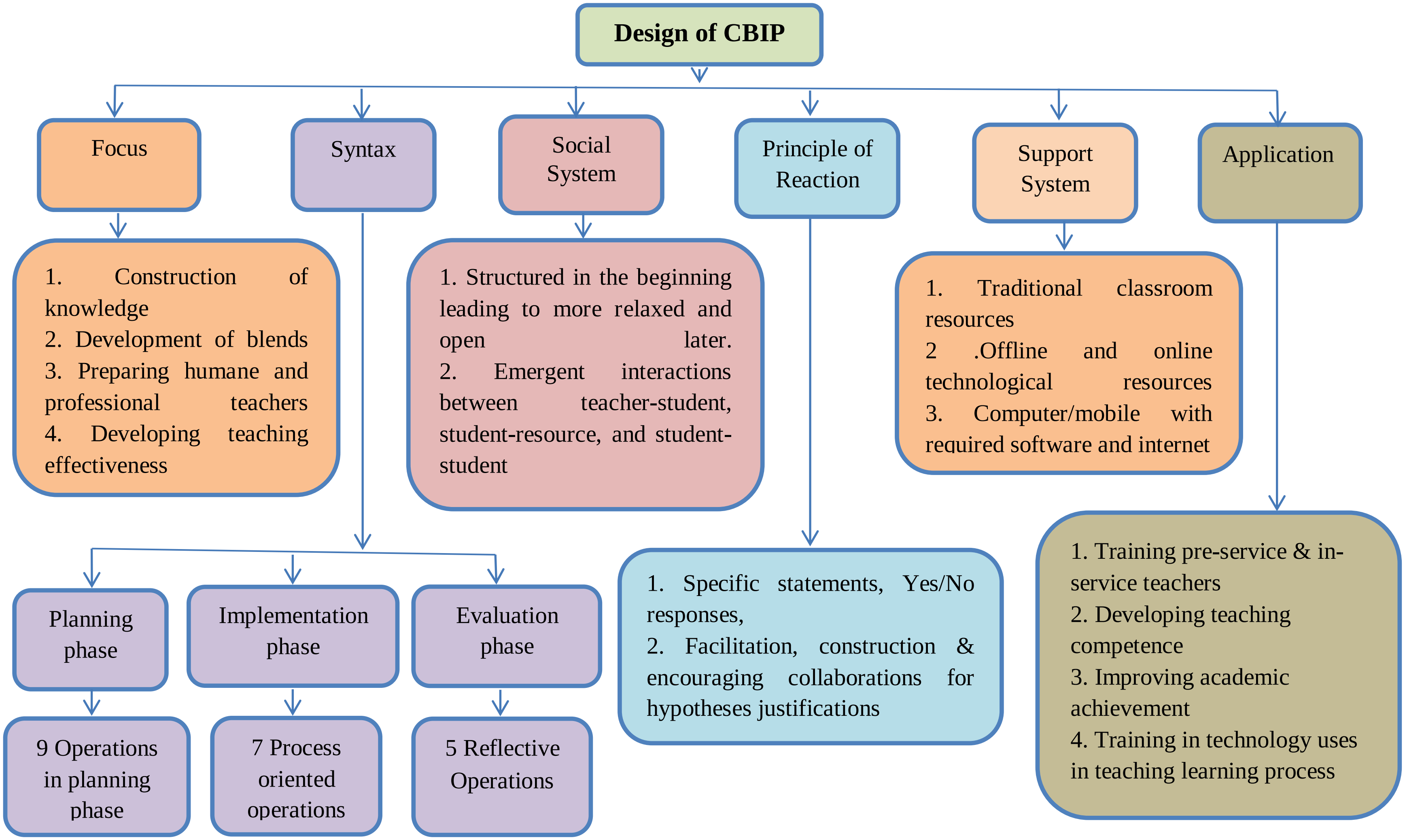
**Theoretical Rationale:**

1. Knowledge is socially constructed. The world and knowledge co-construct each other.
2. Each learner is basically curious and eager to learn new things through the process of assimilation and accommodation.
3. Learner's environment, culture, language and technology play an important role in the construction of new knowledge.
4. Learner actually learns when confronted with the tasks little higher than their present potential.
5. Teacher is not an information provider but s\he is to be seen as constructor of situations or a facilitator.
6. Technology integration facilitates teaching learning process hence improves academic achievement.
7. The blended pedagogies i.e. best from all worlds, traditional face-to-face and on-line learning environment have potential to improve performance of both; teachers and learners.
8. Systematic planning & contextual execution of instructional procedures supported with effective feedback prepare humane and professional prospective teachers.

**B. Designing of Constructivist Blended Instructional Paradigm**

The design of the model was sub divided in to six components (as per Basic teaching model by Glaser, 1962) i.e. focus, syntax, and social system, principle of reaction, support system and application (Figure 3.10). This division was done to make the paradigm more comprehensive and precise.

**Figure 3.10: Design of CBIP**



**1. Focus**: It was the central aspect of the paradigm which included its goals. The goals of CBIP were:

i. Construction of knowledge
ii. Development & use of appropriate blends
iii. Preparing professional and humane teachers
iv. Developing teaching effectiveness of student teachers
v. Improving academic achievement of learners

**2. Syntax**: It consisted of Phases and activities in a specific sequence that described the paradigm in action. The syntax of CBIP has three phases;

I. Planning phase
II. Implementation phase
III. Evaluation phase

**I. Planning Phase (Lesson Planning Development)**

The focus of planning phase was on planning of instruction i.e. instructional designing or lesson planning. The outcome of the planning phase was well-developed lesson plans for all the five subjects. The prescribed syllabi, supplementary references and the updated, reliable internet content were used in lesson planning. It included components like goal setting, need analysis, content analysis, entry behaviour of learners, learning environment, expected outcomes as terminal objectives, decision about teaching - learning strategy & nature of blends, deciding learning resources and developing the strategies & blends, designing formative & summative assessment strategies. All these components worked in collaboration with each other, guiding & directing one another.

**The activities at planning phase are given below:**

**i.** Analysing the subject matter prescribed in text book
ii. Identifying the instructional goals & conducting need analysis
iii. Analysing the entering behavior of the learners
iv. Formulation of instructional objectives
v. Sequencing organization of subject matter

vi. Decision making about teaching - learning strategies
vii. Deciding about the teaching-learning resources
viii. Development of teaching - learning strategy & blends
ix. Development of formative & summative assessment strategies

The description of above activities is presented below;

**i. Analysing the Subject Matter prescribed in Text Book**

The first step was to select appropriate content from prescribed text book keeping in view various contexts like actual teaching- learning time in class & environmental constraints. Generally student teachers plan lessons for full class time and forget to consider the attendance time, previous knowledge testing time, recapitulation time & assignment allotment time etc. For example in a class of 40 minutes, actual teaching- learning time is 30 minutes. So, adequate content need to be selected for 30 minutes and not for 40 minutes. This helps in the instructional time management and solves problems like incomplete delivery of planned content. Keeping these considerations in view, appropriate content was selected for a class of 40 minutes.

**ii. Identifying the Instructional Goals & Conducting Need Analysis**

It deals with the determination of new knowledge and skills we want learners to master. These should be expressed as goals. Broadly it signifies the skill changes in the learner after completion of the instruction. These are general aims and objectives of teaching particular subject and are different from performance objectives which are very specific. Here, the goals were derived form need assessment of learners, practical experiences with students with learning difficulties, other environmental constraints and new knowledge & skills the subject area.

**iii. Analysing the Entering Behavior of the Learners**

Every learner enters in to the instruction process with some knowledge, experiences, attitudes, preferences, belief systems and skills. Many peoples consider this as the entering behavior of the learner. This is not true as entry behavior is very specific and is the prerequisite which is required to learn new content or master new skills in hand. So, it consists of knowledge, experiences, attitudes, preferences, belief systems and skills relating to the present content only. The Entry level Behavior Outcomes were planned for all domains as per Blooms and digital Blooms taxonomy. The learner should demonstrate these behaviors before the start of instruction. If the entry behavior of learners is not satisfactory then entry behavior content needs to be planned & delivered before the start of actual instruction. So, entry level behavior was also planned.

**iv. Formulation of Instructional Objective**

The analysis of subject matter, need analysis, entering behavior of learners guides the formulation of instructional objectives in behavioral terms. These are also called as expected learning outcomes or Terminal Behavior Objectives. The objectives were precisely formulated in line with national, state and institutional perspectives. The objectives were focused on holistic development of learners inside and outside classroom i.e. on real world applications. The objectives were framed keeping in view the Bloom taxonomy (1956), revised Bloom's taxonomy (Anderson, 2001) and digital Bloom taxonomy (Churches, 2008).

Educational psychologist Benjamin Bloom developed taxonomy of learning objectives in 1956. Forty years later Anderson and Karathwohl, former students of Bloom's revisited Bloom's taxonomy and gave revised Bloom's taxonomy in 2001. In 2008, Churches created an extension of the original Bloom's taxonomy and called it digital Bloom taxonomy. It extends the categories of revised Bloom taxonomy in to the digital learning environment. As per revised Bloom taxonomy, the creative thinking is considered as more complex form of thinking than critical thinking. A person can be critical without being creative but one cannot be creative without being critical. Moreover, the original Bloom taxonomy is more appropriate at primary grades but revised version is more universal and suitable for planning instructions at elementary and secondary level. Laufenberg (2010) asserted that in space of time the information became more widely available and from more sources, and was no longer confined to the physical school building. Similar is the case with Blooms taxonomy. From 1956 to 2008 the teacher, learner, needs, learning contexts, social environments has changed. So, objectives need to be framed as per digital Bloom taxonomy also as it is suitable for contemporary technological skills & contexts. Bloom's Digital Taxonomy provides the opportunity for a number of different learning activities for students, using a variety of digital tools. The aim of the taxonomy is not to focus on specific tools but ensure that the student progresses through the hierarchy of levels, building on what they have learnt and using these skills as they move from Lower Order Thinking Skills (LOTS) to Higher Order Thinking Skills (HOTS).

**v. Sequencing Organization of Content**

The prescribed content in text book cannot be taught as such to the learners. The learners are coming to classrooms for getting simplified and comprehensive content. The instructional designers must sequence & organize content for each formulated objective. The content for each objective included content prescribed in text book and extra updated content relating the objective. The web resources were used for selecting appropriate updated content. The prescribed content and updated content was organized as per the principals and maxims of teaching like simple to complex, known to unknown, inductive to deductive, empirical to rational, psychological to rational etc. The action verb/ specific behavior action word were used in objective so as to guide sequencing & organization of content.

**vi. Decision making about Teaching - Learning Strategies and Blends**

Teacher decides about the selection of appropriate strategies of teaching keeping in view the nature and structure of the content, level of the students and objectives. This is the most imporatant step in this paradigm as the teaching learning strategies are traditional, on-line (both synchronous & asynchronous) or hybrid (mixtrue of both traditional & online). Teaching-learning strategies like mobile learning strategy, flipped classroom strategy, on-line collaborative learning, blogging, on-line quiz etc. were planned along with discussions, brainstorming, demonstrations, illustrations, activities, reading, board work, think-pair-share etc.

**vii. Deciding about the Teaching-Learning Resources**

The teaching learning resources were selected after finalization of best suitable strategies. The resources included traditional classroom resources, online resources and appropriate blends of both. The appropriate blends were decided keeping in view following considerations:

- Time, content & contexts
- Electronic gadgets like computer/laptop, mobile
- Available experts
- Internet connection

**viii. Development of Teaching - Learning Strategies**

The teaching – learning strategies were planned as per the needs of students, their present abilities and expected outcomes. The teachers need to train themselves for these strategies beforehand. The confusion, network problems, the gadget problems, non-availability of experts etc. need to be avoided during execution stage. The appropriate leaching learning strategies were developed to give best possible learning environment for learners.

**ix. Development of Formative & Summative Assessment Strategies**

The sectional assessments were planned for every objective. It included the evaluation of the content covered in each objective and the application of understanding in solving day to day life. The main focus was on Outcome based Assessments as per the Programme for International Student Assessments (PISA). The assessment planned were holistic as action verbs used in the objectives guides the various assessment strategies like presentations; written or oral explanations; online posts on blogs, wikis; interactions with experts both offline and online etc. The formative evaluations were planned for diagnostic purposes and relevant remedial feedback was also designed for each objective.

The assessment of the previous objective was connected with the engagement part of the next objective, hence forming a continuous process of instruction and evaluation.  As discussed in the beginning of planning phase, the outcome of the planning phase was well developed lesson plans for all subjects.

### II. Implementation Phase

This phase comprised of student-teacher, student-resource, student-student and student-content interactions. The lesson plans based on CBIP were delivered by student teachers in the implementation phase. This phase was sub-divided in to following steps;

1. Learning organization
2. Presentation of the puzzling problem or events
3. Formulation of hypotheses
4. Verification of hypothesis
5. Formulation of explanations
6. Increasing critical awareness
7. Assessment of understanding & reflections

The implementation phase was the phase of actual practice. Both, the teacher and learners played an active role in various steps of implementation phase. The roles of teachers and learners were defined to lessen the gap between theory and practice or to bring reality close to aspirations put forth by CBIP. The table 3.1 given below presents the suggested activities for each step of implementation phase. The activities covered all domains of development and have relevance to the content. In the implementation phase, 90% activities were performed by learners and 10% by the student teachers. The activities involved the blended strategies as power point presentations, animations, videos, wikis, Blog posts, e-news were integrated in the teaching learning process.

**Table 3.1**

**Suggested Activities and Blended Strategies**

| Step | Suggested activities | Blended strategies |
|---|---|---|
| Learning organization | Greetings, Sizing up of the class, Attendance, Organization of resources, Organization of personal learning resources by learners, Informal discussion (for leading the learner to the topic) | Involving learners in checking internet connection, developing blended learning centers in classroom, checking functioning of projectors, adjusting sitting arrangement as per technology use and inclusive needs of learners; mutual collaborations among teacher and learners. |
| Presentation of the puzzling problem or events | Presentation of disturbing data, puzzling problem or cases from society; Demonstration, Activities, Reading, Free Write, Analyzing graphic organizer & advance organizer | Observations and explorations through offline and online Videos/images/animations, Book content updated with recent information from newspapers |
| Formulation of hypotheses | Investigation, Brainstorming, Surfing on internet, discussion, Collecting information, generating solutions, Reading books, Asking questions, worksheets, | Necessary information search for formulating hypotheses; supplementing book content with updated online content & examples; Reading and posting on Blogs, wikis & discussion forums; working on blended learning stations |
| Verification of hypothesis | Presentation, Presenting solutions, reflections and evaluations, experimentation, Argument, debate, persuasion, | Discussions, arguments & debates with offline and online experts; justification with demonstrations and experimentations, |

| | | |
|---|---|---|
| Formulation of explanations | Analysis & explanations by students, Reading & demonstrations, Formal explanations by teachers, | Explanations supplemented with online and offline videos and animations of abstract concepts; explanations supplemented with activities and experimentations; |
| Increasing critical awareness | Presenting societal problems, Experiential inquiry, decision making, problem solving, online collaborations, offline projects; | Discussions on contemporary cases from society with offline and online experts leading to reflective writings; Internet search for extending knowledge to global level. |
| Assessment of understanding & reflections | Self-assessments, Peer assessments, Offline & online quizzes; rubrics, posts on social media (blog posts, Facebook, twitter, Instagram), Worksheets, Observations, anecdotal records, portfolio, Reflective writings, community projects, redirected and open ended questions, presentations, demonstrations and questions by learners, course seminars and viva voce, online collaborative assignments and creative projects. | Online portfolio for holistic assessments; Offline & online quizzes; posts on social media (blog posts, Facebook, twitter, Instagram) with viva voce, online collaborative assignments and creative projects ending with face to face presentations. |

In the implementation phase, the roles of teacher and learners were also defined for each activity/operation. The table 3.2 given below highlights the same.

**Table 3.2**

**Roles of Teachers and Learners**

| Step | Role of learners | Role of teachers |
|---|---|---|
| Learning organization | Organizer, active reception, proactive role | Visionary, manager, organizer, & controller of resources and situations; based on ethical conduct |
| Presentation of the puzzling problem or events | Observation & reflections on images, animations, videos, wikis, Blog posts, e-news; Assimilation with previous knowledge & Accommodation of new knowledge; Model reading Asking questions | Presenting problematic case, data or event; Creating interest, curiosity and raising questions; Model reading, Structuring problems from immediate environment |
| Formulation of hypotheses | Investigation, Brainstorming, Surfing on internet, discussion, Collecting information, generating solutions, Reading books, Asking questions, Preparation & completion of worksheets | Observation, supervision and facilitation in hypotheses formulations |
| Verification of hypotheses | Arguing, debating, testing & defending the hypotheses; Validating, reviewing & reflecting | Facilitating hypotheses verification process through yes/no types of question-answers; Validating correct explorations |
| Formulation of explanations | Summarizing & paraphrasing; Recording observations, | Encouraging & facilitating the explanations by learners; Giving |

| | | |
|---|---|---|
| | explanations and drawing reasonable conclusions and reflections | technical terminologies and formal explanations |
| Increasing critical awareness | Working independently and in collaboration with both offline and online community to solve problems; Using critical & creative thinking | Encouraging the learners to apply or extend the concepts and skills in new situations; Posingreal case studies as problems, Challenging the understanding with higher order content; Arranging offline & online expert talks |
| Assessment of understanding & reflections | Filling self-assessment forms, rubrics & reflective writing worksheets; Summarizing the module & overall lesson; Giving feedback | Assessing communication, presentation, thinking and social skills throughout the process; Asking questions relating to objectives; Creating situations for affective & psychomotor assessments; Giving remedial help, re-teaching & re-evaluating; Home work |

### III. Evaluation Phase

The evaluation phase consisted of evaluation of paradigm with reference to its focus which included construction of knowledge, development & use of appropriate blends, preparing professional and humane teachers, developing teaching effectiveness, improving academic achievement in learners. The evaluation can be done with the help of evaluation performa or peer evaluations. In the process, the evaluation of paradigm was done with the help of rating scale on teaching effectiveness for student teachers; perception scale towards teaching for learners; academic records of students; and through the informal interviews with school teachers.

**3. Social System**

Social system deals with the Interactive roles of teachers and students in the learning process. It was controlled or structured in beginning then relaxed leading to open environment. There were proper teacher-student, student- resource and student-student interactions

**4. Principles of Reactions**

It deals with the nature of teacher interactions with learners. The student teachers gave specific statements, yes/no answers, encourage collaboration, pointed invalid questions and used previous experiences and ideas of students as source for teaching.

**5. Support System**

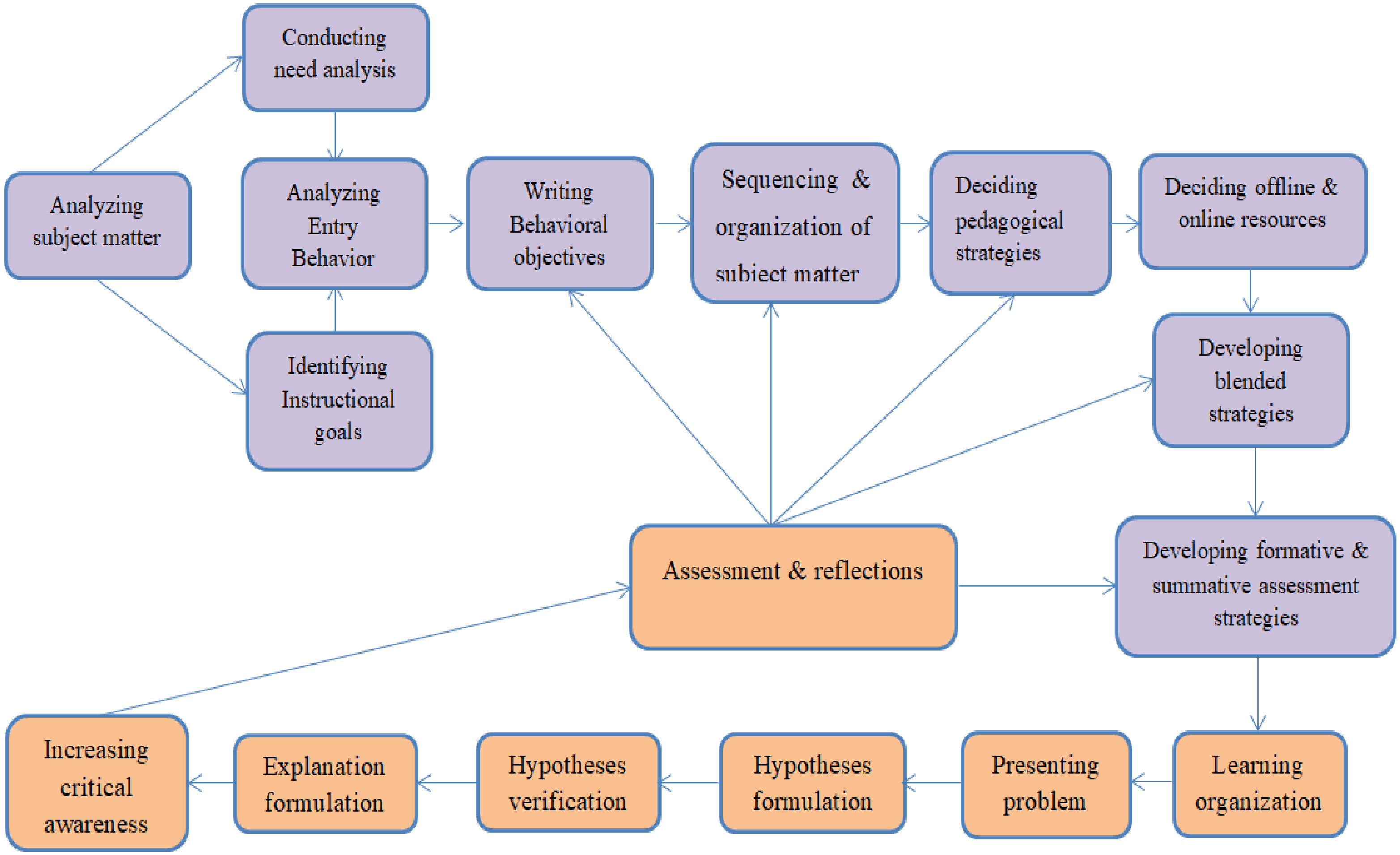
Support system tells about the additional requirements in the teaching learning process. The confronting material or problem, knowledge about construction process, technological resources and computer with installed software and internet connection constituted the support system of CBIP.

**6. Application**

This component tells about the potential uses of CBIP. This paradigm can be used in teaching & training, training pre- service teachers, developing teaching competencies, training in-service teachers for technology use in education, and for improving academic achievement of school students.

The graphical representation of planning and implementation phase of Constructivist Blended Instructional Paradigm (CBIP) as used by student teachers in preparing lesson plans and delivering the same in schools is given below in figure 3.11.

**Figure 3.11**
**Constructivist Blended Instructional Paradigm (CBIP) for Designing Instruction**



After the development of CBIP design, the next step was the development of tools for treatment based on CBIP guidelines. These tools were constructed as lesson plans for all the subjects under study. The detailed description for developing model lesson plan is presented below.

### 3.3.1.2 Development of Lesson Plans Based on CBIP

The model lesson plans were developed for student teacher to teach learners of cooperating schools. The challenge was to arrive at a common consensus for finalizing the lesson plan format as there are prescriptive guidelines of CBIP, different lesson plan formats of cooperating schools and lesson plan format of TEI. So, lesson plan formats of the schools were analysed for finalization of the format. Some of the lesson plan formats of schools are given in figures 3.12-3.15.

**Figure 3.12**

**Lesson Plan Format of Cooperating School-1**

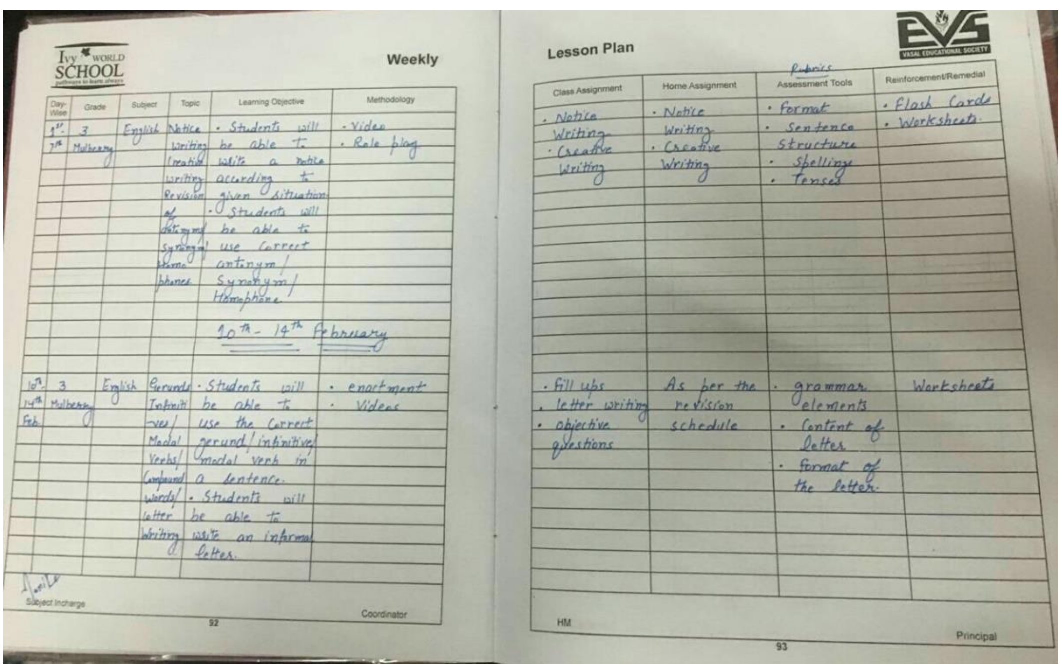
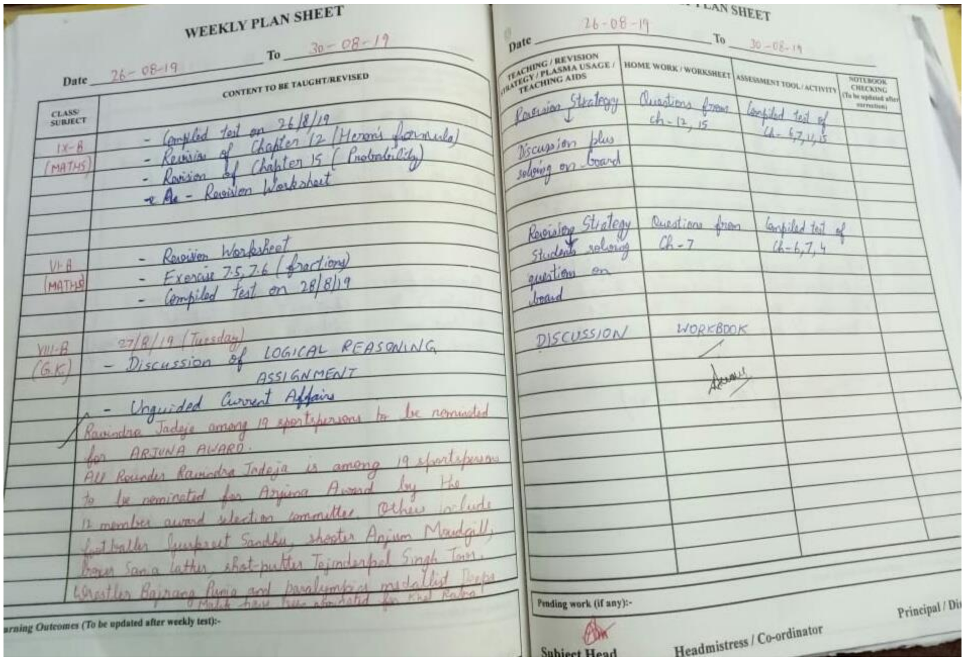



**Figure 3.13**

**Lesson Plan Format of Cooperating School-2**


WEEKLY PLAN SHEET

Date 26-08-19 To 30-08-19

| CLASS/ SUBJECT | CONTENT TO BE TAUGHT/REVISED |
|---|---|
| IX-B (MATHS) | - Compiled test on 26/8/19 - Revision of Chapter 12 (Heron's formula) - Revision of Chapter 15 (Probability) - Revision Worksheet |
| VI-B (MATHS) | - Revision Worksheet - Exercise 7.5, 7.6 (fractions) - Compiled test on 28/8/19 |
| VIII-B (G.K) | 27/8/19 (Tuesday) - Discussion of LOGICAL REASONING ASSIGNMENT - Unguided Current Affairs Ravindra Jadeja among 19 sportspersons to be nominated for ARJUNA AWARD. All Rounder Ravindra Jadeja is among 19 sportspersons to be nominated for Arjuna Award by the 12 member award selection committee. Others include footballer Gurpreet Sandhu, shooter Anjum Moudgil, boxer Sonia Lather, shot-putter Tejinderpal Singh Toor, wrestler Bajrang Punia and paralympics medallist |

Learning Outcomes (To be updated after weekly test):-

Date 26-08-19 To 30-08-19

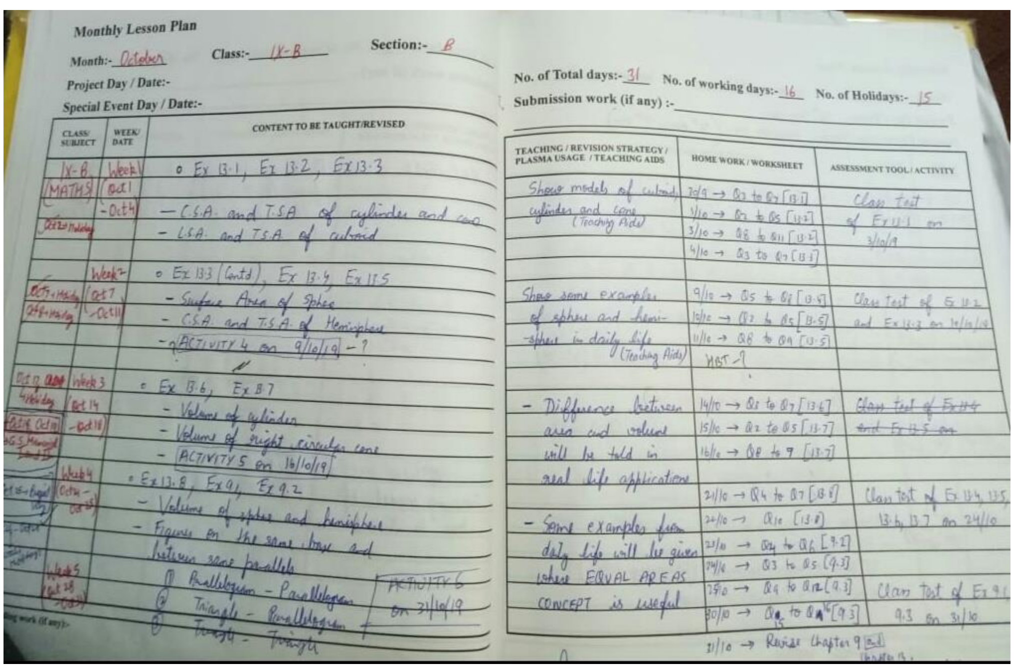
| TEACHING / REVISION STRATEGY / PLASMA USAGE / TEACHING AIDS | HOME WORK / WORKSHEET | ASSESSMENT TOOL / ACTIVITY | NOTEBOOK CHECKING (To be updated after correction) |
|---|---|---|---|
| Revision Strategy Discussion plus solving on board | Questions from ch-12, 15 | Compiled test of ch-6,7,12,15 | |
| Revision Strategy Students solving question on board | Questions from Ch-7 | Compiled test of Ch-6,7,4 | |
| DISCUSSION | WORKBOOK | | |

Pending work (if any):-

Subject Head Headmistress / Co-ordinator Principal / Di

**Figure 3.14**

**Lesson Plan Format of Cooperating School-3**


Monthly Lesson Plan

Month:- October Class:- IX-B Section:- B

Project Day / Date:-

Special Event Day / Date:-

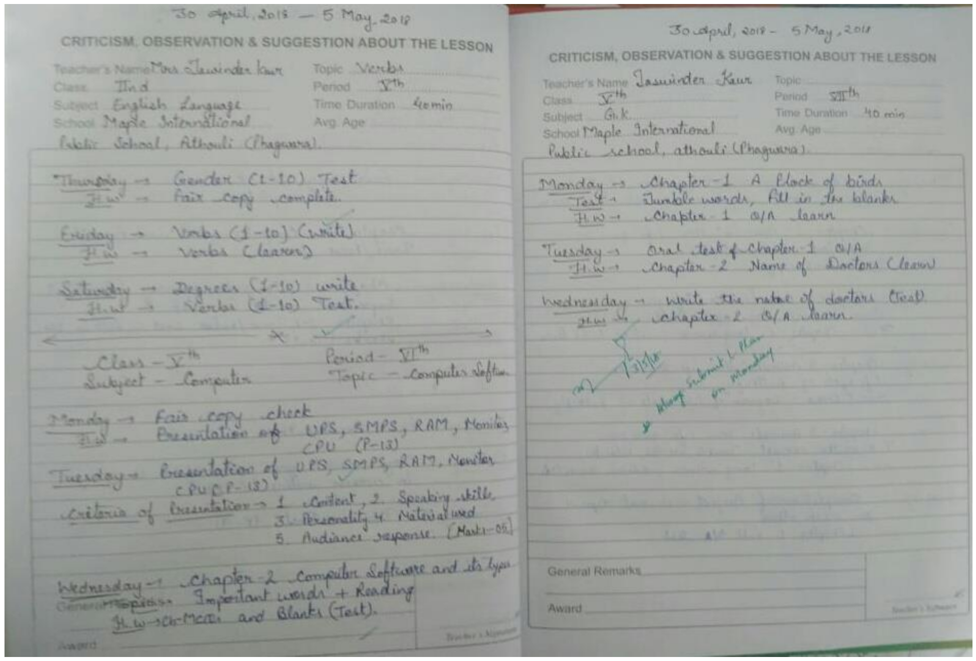
No. of Total days:- 31 No. of working days:- 16 No. of Holidays:- 15

Submission work (if any) :-

| CLASS/ SUBJECT | WEEK/ DATE | CONTENT TO BE TAUGHT/REVISED | TEACHING / REVISION STRATEGY / PLASMA USAGE / TEACHING AIDS | HOME WORK / WORKSHEET | ASSESSMENT TOOL / ACTIVITY |
|---|---|---|---|---|---|
| IX-B (MATHS) | Week 1 Oct 1 - Oct 4 | o Ex 13.1, Ex 13.2, Ex 13.3 - C.S.A. and T.S.A. of cylinder and cone - L.S.A. and T.S.A. of cuboid | Show models of cuboid, cylinder and cone (Teaching Aids) | 30/9 → Q3 to Q7 [13.1] 1/10 → Q1 to Q5 [13.2] 3/10 → Q8 to Q11 [13.2] 4/10 → Q3 to Q7 [13.3] | Class Test of Ex 13.1 on 3/10/19 |
| | Week 2 Oct 7 - Oct 11 | o Ex 13.3 (Contd), Ex 13.4, Ex 13.5 - Surface Area of Sphere - C.S.A. and T.S.A. of Hemisphere - ACTIVITY 4 on 9/10/19 | Show some examples of sphere and hemisphere in daily life (Teaching Aids) | 9/10 → Q5 to Q8 [13.4] 10/10 → Q2 to Q5 [13.5] 11/10 → Q8 to Q9 [13.5] HOT-? | Class Test of Ex 13.2 and Ex 13.3 on 10/10/19 |
| | Week 3 Oct 14 - Oct 18 | o Ex 13.6, Ex 13.7 - Volume of cylinder - Volume of right circular cone - ACTIVITY 5 on 16/10/19 | - Difference between area and volume will be told in real life applications | 14/10 → Q2 to Q7 [13.6] 15/10 → Q2 to Q5 [13.7] 16/10 → Q8 to 9 [13.7] | ~~Class test of Ex 13.4 and Ex 13.5 on~~ |
| | Week 4 Oct 21 - Oct 25 | o Ex 13.8, Ex 9.1, Ex 9.2 - Volume of sphere and hemisphere - Figures on the same base and between same parallels (i) Parallelogram - Parallelogram (ii) Triangle - Parallelogram (iii) Triangle - Triangle ACTIVITY 6 on 31/10/19 | - Some examples from daily life will be given where EQUAL AREAS CONCEPT is useful | 21/10 → Q4 to Q7 [13.8] 22/10 → Q10 [13.8] 23/10 → Q4 to Q6 [9.2] 24/10 → Q3 to Q5 [9.3] 29/10 → Q4 to Q12 [9.3] 30/10 → Q13 to Q16 [9.3] 31/10 → Revise Chapter 9 | Class Test of Ex 13.4, 13.5, 13.6, 13.7 on 24/10 Class Test of Ex 9.1, 9.3 on 31/10 |
| | Week 5 Oct 28 - Oct 31 | | | | |

**Figure 3.15**

**Lesson Plan Format of Cooperating School-4**


30 April, 2018 — 5 May, 2018
CRITICISM, OBSERVATION & SUGGESTION ABOUT THE LESSON
Teacher's Name Mrs. Jaswinder kaur Topic Verbs
Class IInd Period Vth
Subject English Language Time Duration 40 min
School Maple International Avg. Age
Public School, Athouli (Phagwara).
Thursday → Gender (1-10) Test
H.W → Fair copy complete.
Friday → Verbs (1-10) (write)
H.W → Verbs (learn)
Saturday → Degrees (1-10) write
H.W → Verbs (1-10) Test.
Class – Vth Period – VIth
Subject – Computer Topic – Computer Software
Monday → Fair copy check
H.W → Presentation of UPS, SMPS, RAM, Monitor, CPU (P-13)
Tuesday → Presentation of UPS, SMPS, RAM, Monitor CPU (P-13)
Criteria of Presentation → 1. Content, 2. Speaking skills 3. Personality 4. Material used 5. Audience response. (Marks-05)
Wednesday → Chapter-2 Computer Software and its types
Important words + Reading
H.W → Q/A and Blanks (Test).
General Remarks
Award

30 April, 2018 – 5 May, 2018
CRITICISM, OBSERVATION & SUGGESTION ABOUT THE LESSON
Teacher's Name Jaswinder Kaur Topic
Class Vth Period VIIth
Subject G.K. Time Duration 40 min
School Maple International Avg. Age
Public school, athouli (Phagwara).
Monday → Chapter-1 A flock of birds
Test → Jumble words, fill in the blanks
H.W → Chapter-1 Q/A learn
Tuesday → Oral test of Chapter 1 Q/A
H.W → Chapter-2 Name of Doctors (learn)
Wednesday → write the name of doctors (Test)
H.W → chapter 2 Q/A learn.
General Remarks
Award

The analysis of school lesson plan put forward following points;

1. Every school uses different format for lesson planning.
2. The lesson plans are developed on weekly or monthly basis.
3. Lesson plans are not specific. Just name of topic, teaching strategies and number of questions as per book are mentioned.
4. Very few schools (1-2) write learning objectives.

Whereas, as per institutional obligations, the student teachers were to present lessons in 5E approach given by Bybee (1987). The 5E approach consisted of Engagement, Exploration, Explanation, Elaboration and Evaluation as 5 steps.

The seven steps of CBIP were based on constructivist epistemology; hence, they could be easily matched with 5E constructivist approach. The blended learning strategies were incorporated in constructivist 5E approach. Moreover, the differences between CBIP and 5Es approach were in the planning and execution of blended strategies. To ensure small instructional steps, the column approach of 5E was adopted (Rani & Kumar, 2014). The column approach allows focusing on one objective at a time, spiral presentation of content, modular continuous assessments, remediation, and reflection. The step learning organization ensured the proper planning and organization of human and non-human resources. The presentation of problematic event/data/case was similar to the engagement; formulation of hypotheses and verification of hypotheses were relating to exploration; increasing critical awareness included elaboration part; and assessment and reflections included evaluation. The steps of CBIP were more comprehensive than steps of 5Es approach. The student teachers developed lesson plans keeping in view the CBIP epistemology. The model lesson plans (Appendices A) were shown to the school subject teachers and experts for necessary feedback and further corrections. The format of the lesson plan as approved by experts is given below;

**LESSON PLAN NO.: ________**

**Subject:** **Duration:**

**Class:** **Date:**

**Topic:**

**Learning Outcomes:**

**Instructional support:**

- Traditional face-to-face Resources
- Online Learning Resources

**Learning Organization"**

**Teaching learning process**

| Expected Content | Presentation of Problematic event/ data/case | Hypotheses Formulation & Justification | Explanation | Increasing Critical Awareness | Assessment & Reflection |
|---|---|---|---|---|---|
| | | | | | |

**Recapitulation:**

**Home Work:**

**Student Teacher's Signature:**

**Feedback/Remarks:**

**Supervisor Signature**

# MODEL LESSON PLAN IN SCIENCE

**Subject: Science** **Duration: 40 min.**

**Class: 6th** **Date:**

**Topic: Human body & its movement**

**Learning Outcomes:**

1) Write the definition of body movements.
2) Differentiate between body movements and locomotion.
3) Write the definition of joints.
4) Enlist the types of joints.
5) Search for causes of joint pain on Internet.
6) Post comments on Blogs related to joints.
7) Paraphrase the meaning of ball and socket joint.
8) Locate the different examples of ball and socket joint in human body.
9) Demonstrate the working of ball and socket joint.
10) Draw the diagram showing working of ball and socket joint.

**Instructional support:**

**Traditional Face-two-Face Resources:** Worksheet on movements in animals, Worksheet on movements in different part of human body (Worksheets given as appendices B & C).
**Online Learning Resources:** video displaying movements in different parts of human body, Two laptops with Internet, Video demonstrating function of different types of joint, Animation video on working of ball and socket joint.

**Learning organization:** Student teacher takes attendance, checks homework and makes contextual statements to settle down the class as early as possible. He places two computers on the last benches as two working stations for learners to work during the process. He checks for Internet connectivity.

## Teaching- Learning process:

| Expected Content | Presentation of Problematic event/ data/case | Hypotheses Formulation & Justification | Explanation | Increasing Critical Awareness | Assessment & Reflection |
|---|---|---|---|---|---|
| **Body Movements & Locomotion** | Student teacher asks learners to perform some activities such as: Bowling, Kicking, Bending, rotating the neck, rotating the wrist etc.<br><br>Encourages learners to observe carefully and find out the common feature in all these activities. | Learners write<br>1. They are bending their body. 2. They are kicking. 3. They are rotating their neck and wrist etc.<br><br>Student teacher encourages them to find out one commonality in all these activities.<br><br>Learner tells they are moving their body parts.<br><br>Student teacher announces these are called as body movements. | Learners explain that the movements of body parts are known as body movements.<br><br>Student teacher refines the definition.<br><br>Movements of body parts with respect to the body are known as body movements.<br><br>He shows a video on body movements in human beings. | How body movements are different from locomotion?<br><br>Learners fill the worksheet on movements in animals and human beings.<br><br>How these movements do occur? | Define body movements?<br><br>Match the following:<br><table><tr><th>Column A (Animal)</th><th>Colum n B (Body part)</th></tr><tr><td>a. Cow</td><td>i. Whole body</td></tr><tr><td>b. Human</td><td>ii. Fin</td></tr><tr><td>c. Snake</td><td>iii. Wings</td></tr><tr><td>d. Bird</td><td>iv. 2 legs</td></tr><tr><td>e. Fish</td><td>v. 4 legs</td></tr></table> |

| Expected Content | Presentation of Problematic event/ data/case | Hypotheses Formulation & Justification | Explanation | Increasing Critical Awareness | Assessment & Reflection |
|---|---|---|---|---|---|
| **Joints and its types** | Student teacher directs learners to rotate neck & shoulder, bend on knees, move wrist.<br><br>He asks<br>What makes rotating, bending and moving possible in these activities? | Learners write their<br>1. The force applied on body parts allows movements.<br>2. Our body is flexible; hence, movements are natural.<br>3. It is special ability of our body parts etc.<br>He instructs learners to softly touch their shoulder, elbow or wrist while moving a particular body part.<br><br>Learners hypothesize<br>1. There is movement of bones at the point of movement.<br>2. These movements are in different directions.<br><br>He tells these points are called as joints. | Learners watch an animated video on joints carefully and write the definition of joints and their types.<br><br>Learners explain that those points where two bones are joint together are known as joints.<br><br>We can move our forearm to and fro, neck forward, backward, right and left etc. but we cannot move our skull.<br>So, joints can be movable and immovable.<br><br>Teacher trainee write types of joints on the black board as follow<br><br>Joints<br>↓<br>Immovable / Movable<br>↓<br>1. Ball and socket joint<br>2. Pivot joint<br>3. Hinge joint<br>4. Gliding joint | Why the joints of our grandparents start paining in old age?<br><br>Learner works through station rotation model and to read and comment on 'OrthoIndy' Blog on joint care.<br>Learners also search for the answer on Internet. | Write the definition of joints.<br><br>Enlist different types of joints.<br><br>Give examples of movable joints in our body.<br><br>Teacher trainee analyse the blog posts of learners related with Joint care. |

| Expected Content | Presentation of Problematic event/ data/case | Hypotheses Formulation & Justification | Explanation | Increasing Critical Awareness | Assessment & Reflection |
|---|---|---|---|---|---|
| **Module 3**<br><br>**Ball and socket joint** | He shows an animation video on working of ball and socket joint (shoulder joint).<br>He encourages learners to move their own shoulder and relate movement with the movements in video. | Learners hypothesize that 1.There is a space in our shoulder in which a rounded structure of our arm gets fit, which allows it to move in all the directions. 2. This type joint can make a circle or can move at 360 degree. | Learners explain that in these joint a ball like head of a bone fits in to the cup like cavity of another bone.<br><br>Using the ideas of leaners, student teacher draws the diagram of ball and socket joint on the board. | Give another example of ball and socket joint in our body.<br>What are the functions of ball and socket joints in our body?<br>Learners discuss functions among themselves and do peer assessments. | Explain the working of ball and socket joint with the help of diagram.<br><br>Give two examples of ball and socket joint. |

**Recapitulation:** Today, we have discussed about body movements, types of joints and ball and socket joints.

1) Write the definition of body movements.
2) Define joints.
3) Enlist the types of joints.
4) Paraphrase the meaning of ball and socket joint.
5) Give examples of ball and socket joint in human body.
6) Demonstrate the working of ball and socket joint.

**Homework**

**Q.1.** Write the definition of joints.
Q. 2. Enlist different types of joints in human body.
Q. 3. What is ball & socket joint?
Q. 4. Explain the working of ball & socket joint with the help of diagram.
Q. 5. Find out a person having pain in ball & socket joint. Briefly write down the causes and cure he/she is getting.

Similarly, CBIP based model lesson plans were developed for English, Hindi, Mathematics and Social Science. The developed model and lesson plans were shown to experts at National level. The feedback, thus, received is summarized below in table 3.3 and given in appendix-D

**Table 3.3: Expert Views on CBIP and Model lesson plans**

| S. No. | Expert | Observations/ Suggestions |
|---|---|---|
| **1** | **Expert-1** | Thematic analysis was excellent. Explore impact of technology on existing approaches/theories. Syntax of model is fine. Keep Indian conditions in considerations. Lesson plans are reflecting model in question. Appropriate blending is there in lesson plan. It is good for learners. |
| **2** | **Expert-2** | Good Attempt to develop CBIP. Model as per focus. Design is satisfactory. Constructivist strategies and role of teachers and students defined as suggested. Lesson plans are fine. |
| **3** | **Expert-3** | Inclusion of PISA considerations is reflected in evaluation. Add reflection. Theoretically model is perfect and shows blending of constructivism with technology. Apply integrated approaches in evaluation also (as discussed in theory of model). Add more variations in learning outcomes. |
| **4** | **Expert-4** | As discussed earlier, the skills like communication, collaboration, critical thinking, creativity and complex problem solving are reflected in model and lesson plans. The scale dimensions matches with theory and are also reflecting in lesson plans. Model and lessons are fine. Lessons should vary but basic idea should remain intact. |
| **5** | **Expert-5** | Plan shows blended strategies. Both traditional and modern resources used judiciously. Worksheets, animated videos, talks with experts, diagram making etc included in lessons. |

| | | |
|---|---|---|
| | | Best part is planning of strategies in advance. Model and lesson plans are contextual. |
| **6.** | **Expert-6** | No such comprehensive model covering techno constructivism blended learning strategies and different existing theories have been developed earlier. It's comprehensive and holistic. Lesson plans on science and mathematics are well prepared and covering all aspects of model. In times to come more researches will establish the model for Indian system. |
| **7.** | **Expert-7** | Lesson plans are activity based for higher level of learning. Module formation is helpful for both teacher and student. Technology has been used. Use of dictionary and Wikipedia is interesting and motivating (English lesson). Model is comprehensive, good for developing skilled teachers. All skills taken in to consideration. |
| **8.** | **Expert-8** | As discussed earlier changes are incorporated like giving original steps as per theory of model, developing more model blended strategies, consideration of Digital Bloom taxonomy in developing objectives. Plan traditional and Online resources separately in lessons. Make Learning organization a part of lesson plan. |
| **9.** | **Expert-9** | Thematic analysis of basic models done. Flexibility incorporated through variety of activities, inclusiveness reflected in model and lessons. Emphasis on blending strategies is good. Techno-constructivism, digital Bloom taxonomy incorporations are well justified. Lessons are fine and blended. More researches will validate the mode further. |

**Calculation of Content Validity Ration**

Content Validity Ration (Lawshe, 1975; Waltz &Bausell, 1981; Lynn, 1986) (quoted by Streiner et al., 2015) was calculated. The experts evaluated the 11 parameters on 3-point scale (yes=3; No =2; and Modification required=1) and lastly gave remarks for betterment of model and lesson plans.

**Content Validity Ratio (CVR)** = $\frac{n_e - N/2}{N/2}$

The table showing CVR of CBIP and Model lesson plans is given as appendix (F). On the basis of the expert suggestions received (Appendix E) and estimation of CVR, the parameters having $CVR_{critical}$ equal to or more than 0.778 were retained, when number of experts are 9 (Wilson et. al., 2012). So all parameters fulfill the criteria and it shows that the CBIP has content validity. The theoretical framework, design of CBIP and developed lesson plans are in sync with each other.

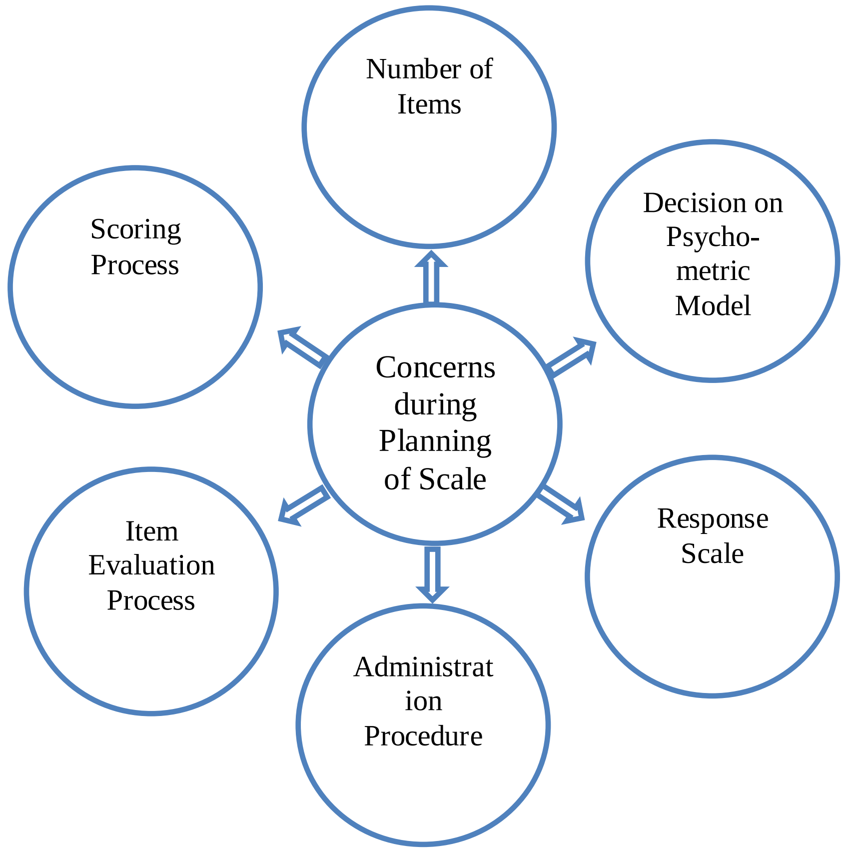
The student teachers were trained to develop and teach through CBIP based lesson plans. They were trained in using preparing quality power point presentations, inserting images, videos and hyperlinks in content, using online platforms like wikis, blogs, e-portfolios and mobile learning in classroom. Beside these they were trained in developing and using blends with model demonstrations. For observing the student teachers in real classroom, Teaching Effectiveness Scale for student teachers was developed and the process of same is as follow;

**3.3.1.3 Teaching Effectiveness Scale (TES Scale)**

The development of Teaching Effectiveness Scale (TES) involved planning and process of scale construction and standardization. The planning phase was concerned with the finalization of all components of scale as highlighted in figure 3.16. The iterative and integrated approach of scale construction and standardisation was adopted as given by Irwing & Hughes, 2018 (quoted by Kyriazos & Stalikas, 2018). It combined the steps put forward by different scale development approaches.

**Figure 3.16**

**Planning for Scale Development**




The detailed procedure adopted for scale construction and standardization is presented in figure 3.17.

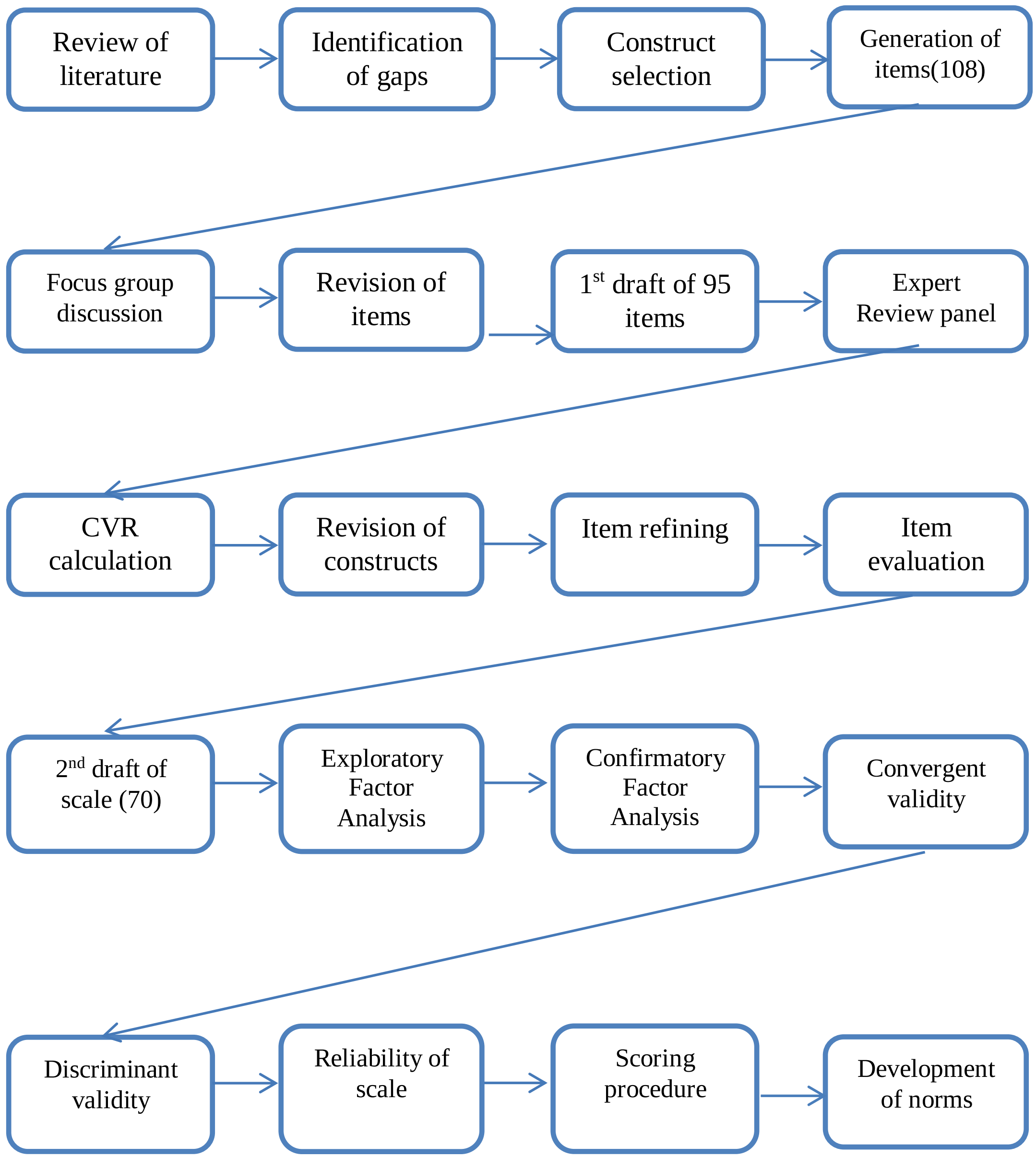
The detailed description of the procedure of TES scale development is given below.

**Step 1: Purpose and Construct of the Scale**

The purpose of the scale construction was to measure the teaching effectiveness of student teachers. The existing scales which measure teaching effectiveness has focused on measuring isolated teaching skills and technological competencies were not considered. Moreover, they generally describe the traits of a teacher and do not give emphasis on the process approach. Moreover, these scales were more suitable to measure the teaching of in-service teachers. Therefore, a new scale was constructed covering the contemporary teaching competencies required for effective teaching. As a rule, the general purpose of the scale was to discriminate student teachers with high level of teaching effectiveness from those with lower levels.

**Figure 3.17**

**Process of Scale Construction and Standardization**




Teaching effectiveness corresponds to the improved teaching competencies or effective teaching in student teachers. The content mastery, personality, aptitude, attitude towards teaching, and classroom management seems to be basic dimensions which effects teaching of a teacher. The recent advancements in ICT applications in education have shifted the focus towards technological competence of teachers.

The review of literature suggested Pedagogical Content Knowledge, Subject matter expertise, Relational Competence with students, Relational competence with society, Professional Competence, Teaching Style of teachers, Classroom Management Style, Personality, Communication, Technological Competence, Teaching aptitude and Attitude towards teaching, and Sense of humor as important attributes of teaching effectiveness.

From international perspectives, the Competency framework for teachers (2004), Australia emphasized upon professional attributes whereas American system focused on contextualized performances. Teaching effectiveness framework (2009), Canadian Education Association emphasized principals based on designing instructions, meaningful work assignment for learners, assessment practices, interdependent relationship and peer mentoring. Finland's successful education system emphasized on professional and professional teacher preparation practices.

In nut shell, the dimensions which emerged from analysis of reviews were Competence in facilitation and management of learning; Inclusiveness in assessment and reporting; Professional competence; Competence in forming partnerships with the school and community; Curriculum and policy planning competence; and Ethical competence

**Step 2: Response Scale Specifications**

The Likert scaling (Likert, 1952) also called as Likert normative scale (Saville & MacIver, 2017) was considered as response format with 7 response options (for finer discriminations and enhancing reliability & validity) labelled as Very Poor=1, Poor=2, Below Average=3, Average=4, Good=5, Very Good=6 and Excellent=7 with average(4) as a mid-point.

**Step 3: Item Generation (Item Pool)**

The literature on teaching effectiveness & its dimensions helped in generating an initial pool of 108 statements. The initial pool of items needs to be 2 to 3 times larger than final scale set (Streiner et al., 2015 & DeVellis, 2017). In item wording, the criteria consisting of clarity, simplicity, specificity, single idea in item and brevity (proposed by Barker et al. 2016) was followed. These statements were made suitable for Indian education context by considering the teaching competency standard NCF (2005) and NCFTE (2010).

**Focus Group Discussions with Stakeholders**

The focus group discussions were held with different stakeholders to identify the contemporary skills of a teacher. The focus group comprised of experts form varied hierarchy levels like teacher educators at national level, school principals, learners and parents/guardians. In such a varied group, the knowledge, experience & expertise gap among members may inhibit the discussions. So, to seek equal participation in scale development process, on-line focus group discussion & one–to-one in depth discussions were held. The feedback and suggestions received after focus group discussions are given below;

1. A teacher should cover all domains of learning, focus more on transaction and assessment, and involve community in teaching learning process.
2. A teacher must possess excellent soft and technical skill, should be proficient in new technologies, and have full mastery over his/her subject.
3. A teacher should reflect professionalism in his/her personality, needs to be technology friendly, have content mastery and good communication skills.
4. A teacher should have mastery in effective transaction of content, proficient in new methods, technology, and above all should be proactive or visionary.
5. A teacher should be expert in teaching, guidance, caring, and making learners good human beings.
6. Teacher should make content easy, understanding, and should be un-biased, come & teach every day, cover full syllabus, and show values.

After the focus group discussions the 108 statements drafted earlier were converted in to 95 statements.

The 1st draft, consisting of 95 statements in 6 dimensions was given to 7 subject experts at national level and 2 language experts for reviewing and rating the statements. The observations and suggestions proposed by experts are presented in table 3.4 given below.

**Table 3.4**

**Observation/Suggestions by Experts**

| S. No. | Observations/ Suggestions |
|---|---|
| 1 | As per statements the dimensions need to be reworked like classroom management and evaluation can be different dimensions, Language needs to be clearer. |
| 2 | As 21st century is digital century, therefore, plan technological skills as different area. Statements should deal with the practical aspects and not philosophical. |
| 3 | The statements are too lengthy. These needs to be précised. Lesson plan needs to be checked for skills like objective formulation, resource selection, pedagogy planned. |
| 4 | The ethical and relationship management should be the part of professional competence. The curriculum and policy planning competence cannot be checked in the classroom. |
| 5 | The Scale should also reflect the lesson plan (Blended Strategies), make separate area for lesson plan evaluation. One dimension should be fully devoted to technological competencies. |
| 6. | The priority should be on the professional competence & knowledge construction. The evaluation skills are equally important. As this is digital era, therefore, technology should influence each aspect. Some of the items of professional competence are overlapping in knowledge construction & facilitation competence. Modern skills like blog & portfolio use, evaluation rubrics, technological blends are very well incorporated in the scale. |
| 7. | The words like specific behavioral outcomes, three domains of development, assumed knowledge, challenging learning situations, expected outcomes, blends, asynchronous teaching learning resources etc. needs to be objectively |

| | |
|---|---|
| | defined in manual so as to convey same meaning to all observers. The statements need to be reduced. As the aim of the scale is to assess teaching effectiveness, therefore the skills like communication, collaboration, critical thinking, creativity and complex problem solving should be included in professional competence. |

For selecting the most valuable items, Content Validity Ration (Lawshe, 1975; Waltz & Bausell, 1981; Lynn, 1986) (quoted by Streiner et al., 2015) was calculated. The experts evaluated the items on 4-point scale (Highly relevant=4; Quite Relevant but needs rewording =3; somewhat Relevant =2; and Not relevant=1).

$$\textbf{Content Validity Ratio (CVR)} = \frac{n_e - N / 2}{N / 2}$$

(Where $n_e$ is the number of experts with a rating of 3 or 4 and N is the total number of experts). On the basis of the expert suggestions received and estimation of CVR, 63 items were retained as such, 9 items were retained with modification and 23 items were deleted. The statements having $CVR_{critical}$ equal to or more than 0.778 were retained, when number of experts are 9 (Wilson et. al., 2012). The table showing CVR of teaching effectiveness scale is given as appendix G).

The following table 3.5 shows the revised dimension of the scale as per the feedback received from different experts

**Table 3.5**

**Revised Dimensions of the Teaching Effectiveness Scale**

| **S. No.** | **Old Dimensions (No. of statements)** | **Revised Dimensions (No. of statements)** |
|---|---|---|
| 1. | Competence in facilitation and management of learning (26) | Knowledge Construction & Facilitation Competence (19) |
| | | Lesson Planning Competence (9) |
| 2. | Inclusiveness in Assessment and Reporting (12) | Evaluation Competence (11) |

| | | |
|---|---|---|
| 3. | Professional Competence (27) | Professional Competence (18) |
| 4. | Competence in forming partnerships with the School Community (13) | |
| 5. | Curriculum and Policy Planning Competence (5) | Technology Competence (9) |
| 6. | Ethical Competence (12) | Classroom Management Competence (6) |
| | **Total (95)** | **Total (72)** |

**Pilot testing of items**

The 7 point Likert teaching effectiveness scale consisting of 72 statements was used to observe the student teachers from three different TEI for the sessions 2016-17 & two TEIs for 2017-18. Total875 lessons were observed for the purpose of standardization. For item refining, the item mean, standard deviation, skewness, kurtosis and item-total correlation were computed. As per standard criteria, the items with mean less than 2 and greater than 4 (Jang & Roussos, 2007), and items with SD < 1 should be eliminated (Jackson, 1970). The items with skewness less than 3 (Distefano, 2006) and Kurtosis less than 8 (Barry and Finney, 2008) should be retained. And moreover, item-total correlation should be >0.25 (Likert, 1932). Out of 72 items selected after item refining, 70 items fulfilled the criteria and two items (item number 10 & 16) were deleted. So, these 70 items were further subjected to item evaluation using independent sample t-test.

**Step 4: Item Evaluation**

The total scores of all 70 items were arranged in ascending order and the scores of upper and lower 27% of data were taken. The significance of difference between means of each item was calculated using independent samples of t-test (Edward and Kilpatrck, 1948). The independent t' test was computed by using SPSS & items having p-values < 0.05 shows there exists a difference in upper and lower group. All statements were having p-values < 0.05, so all statements were retained. The details of p-values are given as appendix (H).

On the basis of expert suggestions, CVR, pilot testing and item evaluation the 2nd draft of scale was prepared. The details of assumed dimensions and their indicators are given in table 3.6.

**Table 3.6**

**2nd Draft of the TES Scale**

| S. No. | Dimensions | Sub-dimensions (depicting behaviour) | TES statements |
|---|---|---|---|
| 1 | **Lesson Planning Competence (LPC)** | Objective formulation, Relevancy, adequacy, content organization, Resource identification & selection, Selection of methods &strategies as per context, | 1-8 |
| 2 | **Knowledge Construction & Facilitation Competence (KCFC)** | Topic exploration, Use of resources, Content mastery, Expert in subject, Facilitator role, teaching style, Constructivist approach, Holistic instruction, Higher order skills, Engagement, Exploration, Explanation, Board work, Elaboration skills, Questioning, Teaching strategies , Stimulus variation | 9-26 |
| 3 | **Technology Competence (TC)** | Technology handling, Effective use, integration with traditional resources, Self developed technological inputs, Use of synchronous and asynchronous resources | 27-35 |
| 4 | **Professional Competence (PC)** | Professionalism, Ethical, Relational, communication, Resource management, Personality, Passion & dedication, Role model, Maintain harmonious relations, Accepting, Open minded | 36-53 |
| 5 | **Classroom Management** | Withitness, Maintaining academic environment, Developing self-discipline, Modeling positive | 54-59 |

| | | | |
|---|---|---|---|
| | **Competence (CMC)** | behavior, Rewarding good behavior, Correcting bad behavior, Managerial | |
| 6 | **Evaluation Competence (EC)** | Closure, recapitulation, CCE practices, Technology use, One line evaluations, Variety of assessment techniques, Homework, Assignments | 60-70 |

This draft of TES Scale consists of 70 statements/indicators grouped under 6 main dimensions. In this draft Knowledge Construction & Facilitation Competence (KCFC) &Professional Competence (PC) were given equal weightage and together placed at first place. These are followed by Evaluation Competence (EC), Technology Competence (TC), Lesson Planning Competence (LPC) and in last Classroom Management Competence (CMC).

**Step 5: Dimensionality of the Scale**

The dimensionality of the scale was examined through

Exploratory Factor Analysis and Confirmatory Factor Analysis (Furr, 2011; Singh et al. 2016) were computed to examine the dimensionality of the scale. The detailed description is presented below.

**Exploratory Factor Analysis (EFA)**

The TES Scale consisting 70 statements was subjected to data reduction technique to form dimensions/factors through Exploratory Factor Analysis (EFA). Before performing EFA, the Kasier Meyer-Olkin (KMO) test for sample adequacy (Kaiser, 1958) and Barlett test of Sphericity for factorability (Bartlett, 1954) were performed to test adequacy of data for exploratory factor analysis. The results indicated KMO, Measure of Sample Adequacy (MSA) was found to be 0.975 depicting that the sample is adequate for further analysis as the obtained value is greater than the critical value i.e. 0.6 (Tatachnick & Fidell, 1996) and Bartlett's test of Sphericity revealed a satisfactory significant number of correlations among variable with $\chi^2$=79701.216 (p=0.00) indicating that sample is suitable for structure detection. So, finally 61 items converged in rotation with approximately 75% of total variance (>50%; Russel, 2000) in 5 factors. These were Lesson Planning Competence (LPC), Knowledge Construction & Facilitation Competence (KCFC), Technological Competence (TC), Professional Competence (PC) and Evaluation Competence (EC). The indicators of Classroom Management Competence (CMC) get merged with the Professional Competence. The final results of EFA are summarized in the appendix (I) given in the end.

### Confirmatory Factor Analysis

Confirmatory Factor Analysis (CFA) was applied using AMOS 23.0, to confirm and validate the factors of TES Scale explored through EFA. The model fit indices (Brown, 2012 & 2015) used were Chi-square goodness of fit ($\chi^2<3$ with þ>0.05; where lower values shows good fit), Parsimony-Corrected Fit [RMSEA (Root Mean Square Error of Approximation) ≤ 0.05, lower values shows good fit], Comparative Fit (Tucker-Lewis Index [TLI], Comparative Fit Index [CFI] ≥ 0.90, higher values shows good fit), Standardized Root Mean Square Residual [(SRMR) < .08, lower values shows good fit], GFI >0.80 and AGFI >0.90. The results of fit indices are given below in the table 3.7.

**Table 3.7**

**Model Fit Indices for TES**

| **Measure** | **CMIN/df** | **GFI** | **AGFI** | **TLI** | **CFI** | **RMESA** |
|---|---|---|---|---|---|---|
| **Calculated Values** | 2.021 (p=0.227) | 0.828 | 0.943 | 0.912 | 0.920 | 0.038 |
| **Threshold Values** | <3 (p>0.05) | >0.80 | >0.90 | >0.90 | >0.90 | <0.05 |

### Construct Validity

The construct validity of the scale was established through calculation of convergent and discriminant validity.

### Convergent validity

Convergent validity checks whether the measures of different constructs are related or not. It was checked through factor loadings, Average Variance Extracted (AVE) and construct reliabilities (CR). The standard values includes item factor loading ≥0.5 and þ <0.05; AVE ≥0.5 and CR ≥0.7 (Fornell & Larcker, 1981). The details are given in table 3.8.

**Table 3.8**

**Convergent Validity indicating Factor Loadings, AVE, CR for TES Scale**

| Factors | AVE | CR |
|---|---|---|
| KFC | 0.96 | 0.99 |
| LPC | 0.93 | 0.99 |
| TC | 0.89 | 0.98 |
| PFC | 0.92 | 0.99 |
| EC | 0.93 | 0.99 |

### Discriminant Validity

Discriminant Validity discriminates between dissimilar constructs. It was measured by calculating the square root of AVE for each construct and it should be greater than correlation of any pair of latent constructs (Chin, 1998) and ≥0.50 (Fornell & Larcker, 1981). The details are given in table 3.9.

**Table 3.9**

**Discriminant Validity of TES Scale**

| Construct | LPC | KCFC | TC | PC | EC |
|---|---|---|---|---|---|
| LPC | 0.96* | | | | |
| KCFC | 0.895 | 0.97* | | | |
| TC | 0.824 | 0.851 | 0.94* | | |
| PC | 0.851 | 0.945 | 0.829 | 0.95* | |
| EC | 0.816 | 0.907 | 0.75 | 0.927 | 0.96* |

*square roots of AVE

Table 3.8 shows that all values of square root of AVE are >0.5. The square root of AVEs is greater than the correlation between different constructs thereby discriminating each construct from the other construct. The convergent and discriminant validity shows that all the constructs of the scale met with the all critical values so; the teaching effectiveness scale possesses good construct validity on the selected standardization sample.

**Internal Consistency**

The internal consistency of the scale was estimated by interpreting the calculated value of Cronbach's alpha (α) & split method reliability (odd and even method). According to Gliem and Gliem (2003) reliability coefficient ranges from 0 to 1. However, there is no lower limit to reliability coefficient therefore; closer the value of 'α' to 1 greater will be the internal consistency of the scale. For the present scale reliability coefficients are given in the table 3.10:

**Table 3.10**

**Reliability of TES**

| Method of Reliability | Coefficient of Reliability | Strength of Internal Consistency |
|---|---|---|
| **Cronbach α** | 0.933 | Very Good |
| **Split half Reliability (Spearman Brown Prophecy formula)** | 0.742 | Good |

So, it is clear from above table that reliability coefficient using Cronbach alpha and split half method of reliability is 0.933 and 0.742 respectively thereby indicating that scale possess good internal consistency.

Therefore, all the 61 items subjected to CFA were retained. All items are having AVE for all factors > 0.5. The statements coming under same dimension/factor are further grouped together in serial order in the final scale. So, final scale consisted of 61items distributed in 5 factors (Appendix J). The details are presented below in table 3.11.

**Table 3.11**

**Dimension wise Distribution of Items in TES**

| Sr. No. | Dimension | Items | Item in final scale | Total |
|---|---|---|---|---|
| **1** | Lesson Planning Competence (LPC) | 1-8 | 1-8 | 8 |
| **2** | Knowledge Construction & Facilitation Competence (KCFC) | 9-26, 36-39, 44,50 | 9-32 | 24 |
| **3** | Technology Competence (TC) | 27-33 | 33-39 | 7 |
| **4** | Professional Competence (PC) | 43-45, 47-49, 52, 54-56, 58-60 | 40-51 | 12 |
| **5** | Evaluation Competence (EC) | 52-61 | 52-61 | 10 |
| **Total** | | **61** | **61** | **61** |

The description of TES scale from preliminary draft to final draft is presented in table 3.12.

**Table 3.12**

**Details of Scale Construction and Standardization**

| S. No. | Draft | Process | Dimensions | Number of Statements |
|---|---|---|---|---|
| 1. | Preliminary draft | Review | Pool of items | 108 |
| 2. | 1st Draft | Focus Group Discussion | 6 | 95 |
| 3. | | CVR | 6 | 72 |
| 4. | | Item refining | 6 | 70 |
| 5. | 2nd Draft | Item Evaluation | 6 | 70 |
| 6. | | EFA | 5 | 61 |
| 7. | 3rd Draft/Final Draft | CFA | 5 | 61 |

**Step 6: Norming**

The instructions for administration & scoring were developed.

Teaching Effectiveness Scale (For prospective teachers) is a 7 point observation scale developed to assess the teaching competencies of prospective teachers or any teacher while teaching in real classroom. It is not based on perceptions or assumptions about teaching but deals with actual observations of teaching learning process going inside the classroom.

- The statements ranging from 1-7 are concerning with lesson planning. The observer should rate these statements by observing relevant lesson/instructional plan.
- The statements ranging from 7-61 should be observed in real situation while the prospective teacher/teacher is delivering the lesson plan.
- Tick (√) the appropriate rating as per your observation. [Abbreviations: VP (Very Poor), P(Poor), BA(Below Average), A(Average), G(Good), VG(Very Good), E(Excellent)]
- The ratings should be filled by supervisor with in the time limit of class period time (35-60min).

**Scoring**

TES consists of 61 statements. All the statements are positive. Each statement is followed by seven responses on a continuum with scoring as given in table 3.13.

**Table 3.13**

**Scoring procedure for TES**

| **Response situation** | **Very Poor** | **Poor** | **Below Average** | **Average** | **Good** | **Very Good** | **Excellent** |
|---|---|---|---|---|---|---|---|
| **Score** | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

**Development of Norms**

The minimum score of TES can be 61 and highest can be 427. The descriptive statistics for the collected data is as follows:

**Table 3.14**

**Descriptive Statistics of TES**

| N | Mean | SD |
|---|---|---|
| 875 | 326.87 | 58.18 |

The researcher estimated z-score norms for TES scale on the basis of the raw scores obtained by the representative sample using formula (X-M/σ), where X is raw score of the individual respondent, M is mean of the representative sample, σ is standard deviation of representative sample. The z-scores corresponding to raw scores are given in the appendix K. The Z-scores are further categorized into five levels of effectiveness as shown below:

**Table 3.15**

**Level of Teaching Effectiveness**

| Sr. No. | Raw Scores | Range of Z-Score | Level of Teaching Effectiveness |
|---|---|---|---|
| 1. | 323 & Above | 0.69 & Above | High Level |
| 2. | 302-323 | 0.27 to 0.69 | Above Average |
| 3. | 290-302 | 0.06 to 0.27 | Average Level |
| 4. | 249-290 | - 0.72 to 0.06 | Moderate Level |
| 5. | Below 249 | Below -0.72 | Low Level |

The final Teaching Effectiveness Scale (TES) for student teachers were having 61 statements grouped under 6 dimensions (Appendix M). Student Perception Scale (SPS) towards Teaching was developed along with the Teaching Effectiveness Scale (TES) for student teachers. Hence, it was a parallel scale to TES. The final TES scale consisting of

61 statements in 5 dimensions was used to develop Student Perception Scale towards Teaching.

### 3.3.1.4 Student Perception Scale (SPS) towards Teaching

From 61 statements of final TES Scale, 50 statements were developed for Student Perception Scale towards Teaching. These statements were first shown to supervisor and then to the same panel of experts consulted for preparation of TES scale. The 1st draft of the scale was consisting of 50 statements in 5 dimensions. The 5 dimensions of the scale were Anticipatory Skill Competence (ASC), Knowledge Construction & Facilitation Competence (KCFC), Technology Competence (TC), Professional Competence (PC) and Evaluation Competence (EC). The only one difference in dimensions is Lesson Planning Competence (LPC) of the final TES Scale was revised to Anticipatory Skill competence (ASC) in Student Perception Scale towards teaching. The 1st draft was shown to 7 subject experts at national level and 2 language experts. The observations and suggestions given by experts are given in table 3.16.

**Table 3.16**

**Observation/Suggestions by Experts**

| S. No. | Observations/ Suggestions |
|---|---|
| 1 | Statements regarding communication are overlapping. Number of statements can be reduced. The statements in professional competence need modification. |
| 2 | All statements are well planned but school students should be given orientation of different terminologies used in the scale. |
| 3 | Students may not comprehend the words used like self- assessments, peer evaluation, on line resources. Orientation session must be planned for students. All 5 dimensions are well thought and cover essential indicators. |
| 4 | The Scale should reflect more on technological competencies. The items corresponds to the other scale (TES Scale) |
| 5 | Some of the items of professional competence are overlapping in knowledge construction & facilitation competence. Modern skills like blog & portfolio use, evaluation rubrics, technological blends should be incorporated in the scale. |

| | |
|---|---|
| 6. | The statements can meet the objective of research. Special care required during collection of data from students as students are not experienced to judge their teachers on mentioned standard. The students should be made aware of these things. |
| 7. | Language needs to be more clear and description of terminologies needs to be given in manual. |

The experts reviewed the scale and gave ratings to each statement as “essential," "useful" or "not necessary. The Content Validity Ration (CVR) of SPS was calculated by using Lawshe (1975, p. 567) criteria for calculating CVR.

On the basis of the qualitative suggestions received and estimation of CVR quantitatively, 41 items were retained as such, 3 items were retained with modification and 6 items were deleted. The statements having $CVR_{critical}$ equal to or more than .778 were retained, when no. of experts are 9 (Wilson et. al. (2012). The table showing CVR of Student Perception Scale towards Teaching is given as appendix L in the end. The 5 point Likert scale consisting of 44 statements was used to measure perception of 242 schools students from 5 different schools, which were taught through CBIP.

**Item Evaluation**

After refining the items, they were analyzed in terms of their ability to differentiate upper and lower groups. For analyzing these differences the procedure of item analysis was followed using which the total score of all items were arranged in ascending order and then the scores of upper and lower 27% respondents of total sample of 242, which makes approximately 66 respondents, were taken. The significance of difference between means of each item was calculated using independent samples of t-test (Edward and Kilpatrick, 1948). The independent t’ test was computed by using SPSS & items having p-values less than 0.05 shows there exists a difference in upper and lower group. 39 statements have p-values less than 0.05, so these were retained whereas 5 statements have p-values more than .05 and were deleted. So the final Student Perception Scale towards Teaching is having 39 statements distributed in 5 dimensions. The details of p-values are given in appendix M at the end. The table 3.17 shows dimension wise distribution of items in Student Perception Scale towards Teaching.

**Table 3.17**

**Dimension wise Distribution of Items in SPS**

| Sr. No. | Dimension | Sr. No. of Item | Total |
|---|---|---|---|
| **1** | Anticipatory Skill competence (ASC) | 1-6 | 6 |
| **2** | Knowledge Construction & Facilitation Competence (KCFC) | 7-19 | 13 |
| **3** | Technology Competence (TC) | 20-22 | 3 |
| **4** | Professional Competence (PC) | 23-34 | 13 |
| **5** | Evaluation Competence (EC) | 35-39 | 5 |
| **Total** | | | **39** |

So, the final Student Perception Scale towards Teaching was having 39 statements distributed in 5 dimensions (Appendix N). This scale was used to see the effectiveness of the developed paradigm in teaching skills or competencies of student teachers through perception of school students.

The student teachers delivered lesson plans in real classroom which were observed through TES scale and perception of learners was taken through SPS scale. The teaching effectiveness scale for observing student teachers and perception scale for learners were standardized. The next important step was standardization of CBIP.

### 3.3.1.5 Standardization of Constructivist Blended Instructional Paradigm (CBIP)

For the purpose of standardization of CBIP, 5 student teachers (one each from Science, English, Hindi, Social Sciences & Mathematics) having above average level of teaching effectiveness were selected through convenience sampling technique. The 5 student teachers were trained to teach through lesson plans based on CBIP during their teaching internship in 3 secondary schools in $6^{th}$, $7^{th}$& $9^{th}$ grades. The students in these classes were already grouped in two sections. The student teachers administered a self-constructed test (pre-test) on the school students in their respective subjects. On the basis of pre test scores, the 166 school students having scores of 60% and above were grouped in two groups i.e. experimental and control group with minimum possible shuffling of students. In all the three schools equitable technological resources were created. The mobiles and the laptops/computers of the student teachers were used during the teaching learning process in experimental groups. For using rotation model of blended learning, use of minimum three laptops/computers was made mandatory. In this manner all school students were provided with access to similar kind of technological resources.

In experimental group, the student teachers took classes of 83 learners by using CBIP paradigm. Simultaneously, 5 school teachers took classes of control group having 83 learners with same syllabus using traditional method of teaching. The following table (Table 3.18) depicts the sample distribution of CBIP standardization process.

**Table 3.18**

**Sample for Standardization Process**

| S. No. | Subject | Class | Control group | Experimental group |
|---|---|---|---|---|
| 1. | Science | 9th | 17 | 17 |
| 2. | English | 6th | 18 | 18 |
| 3. | Hindi | 9th | 18 | 18 |
| 4 | Social Sciences | 7th | 15 | 15 |
| 5 | Mathematics | 7th | 15 | 15 |
| Total | | | 83 | 83 |

In experimental groups, the student teachers by using CBIP completed 2 chapters from the regular text books of each subject, approximately through 11-12 lesson plans/periods of 35 minutes followed by a unit test as normal formalities of CCE. In between, student teachers' 1st, 6th& 11th lessons too were observed in the experimental groups to see the efficacy of CBIP paradigm. In this way, data of pre-post achievement scores of learners in the school classroom and teaching effectiveness scores of student teachers were simultaneously collected. The standardization of CBIP was done in following three ways;

1. The significance of difference between means of consecutive observations of student teachers to explore the impact of CBIP on teaching effectiveness.
2. The performance based standardization where pre–post experimental research design was applied on achievement scores of learners in experimental groups.
3. The matched group post-test research design was used to find out the differences in academic achievements of learners taught through CBIP (experimental group) & through traditional method of teaching (control group).

The details of all the three ways of standardization are as below:

## 1. Significance of difference among Means of Consecutive Observations

As stated earlier 1st, 6th& 11th lessons of student teachers of experimental groups were observed with the help of teaching effectiveness scale and were treated as observation-1, 2 and 3 respectively. To test the efficacy of CBIP on the teaching effectiveness of student teachers, paired sample t' test was used on these three observations of the student teachers. The results are presented in table 3.19 given below.

**Table 3.19**

**Difference in Mean Observation Scores of Student Teachers**

| Observation Number | Mean | N | SD | $SE_D$ | t' value | p-value |
|---|---|---|---|---|---|---|
| Observation-1 | 351.00 | 5 | 53.46 | 16.01 | 3.71* | 0.02 |
| Observation-2 | 410.40 | 5 | 20.96 | | | |
| Observation-1 | 351.00 | 5 | 53.46 | 21.32 | 3.42* | 0.02 |
| Observation-3 | 424.00 | 5 | 11.07 | | | |
| Observation-2 | 410.40 | 5 | 20.96 | 8.15 | 1.67 | 0.17 |
| Observation-3 | 424.00 | 5 | 11.07 | | | |

*significant at 0.01 level of significance

The p-value in the table 3.19 is probability value for a given statistical model. If the p-value is less than 0.05, the null hypothesis of no difference between the means is rejected, leading to infer that a significant difference exists between the two groups. Table 3.18 reveals the significant difference in teaching effectiveness of student teachers between 1st& 2nd and 1st& 3rd observations. The teaching effectiveness mean from 2nd to 3rd observation has also increased but, however, the increase was not found significant. The mean difference between observation 3 (M=424; SD=11.07) and observation 1 (M=351; SD=53.46) was significant at t' (DF=4) = 3.42, p-value=0.02. So, the significant differences were observed in the observations and it was concluded that CBIP has increased the teaching effectiveness of student teachers. Hence, CBIP was effective.

## 2 Effect of CBIP on Academic Performance of Learners

The 2ndway of standardization was performance based. The pre-post experimental research design was used on all five experimental groups to explore the impact of CBIP on academic performance of learners. The null hypothesis was formulated as there is no effect of CBIP on academic performance of learners. The paired t' tests were calculated for all the five subjects in experimental/treatment groups as given in table 3.20.

**Table 3.20**

**Difference between Mean Pre-test and Post-test Scores of learners**

| Subject | Test | Mean | N | SD | $SE_D$ | t' value | p-value |
|---|---|---|---|---|---|---|---|
| Science | Pre-test | 18.65 | 17 | 3.60 | 0.521 | 5.54* | 0.00 |
| | Post test | 21.53 | 17 | 3.91 | | | |
| Maths | Pre test | 19.40 | 15 | 5 | 0.330 | 8.88* | 0.00 |
| | Post test | 22.33 | 15 | 4.94 | | | |
| English | Pre test | 18.00 | 18 | 2.61 | 0.505 | 2.64* | 0.01 |
| | Post test | 19.33 | 18 | 3.46 | | | |
| Hindi | Pre test | 17.44 | 18 | 3 | 0.571 | 3.31* | 0.00 |
| | Post test | 19.33 | 18 | 4.23 | | | |
| Social Science | Pre test | 17.93 | 15 | 3.53 | 0.853 | 2.66* | 0.01 |
| | Post test | 20.20 | 15 | 5.18 | | | |
| Overall | Pre test | 18.25 | 83 | 3.56 | 0.26 | 8.58* | 0.00 |
| | Post test | 20.48 | 83 | 4.40 | | | |

*significant at 0.01 level of significance

Table 3.20 shows that mean difference between pre-test (M=18.25; SD=3.56) and post-test (M=20.48; SD= 4.40) was significant at t' (DF = 82) = 8.58, p=0.00. So, the null hypothesis that there is no difference between pre and post achievement scores was rejected. In Science subject, the mean difference between pre-test (M=18.65; SD=3.60) and post-test (M=21.23; SD= 3.91) was significant at t' (DF =16) = 5.54, p=0.00. In Mathematics, the mean difference between pre-test (M=19.40; SD= 5) and post-test (M=22.33; SD= 4.94) was significant at t' (DF =14) = 8.884, p=0.00. In English subject, the mean difference between pre-test (M=18; SD=2.61) and post-test (M=19.33; SD= 3.46) was significant at t' (DF =17) = 2.64, p=0.01. Similarly, in Hindi subject, the mean difference between pre-test (M=17.44; SD=3) and post-test (M=19.33; SD= 4.23) was significant at t' (DF =17) = 3.31, p=0.00. In Social Science subject, the mean difference between pre-test (M=17.93; SD=3.53) and post-test (M=20.20; SD= 5.18) was significant at t' (DF =14) = 2.66, p=0.00. So, the significant differences were found in pre and post-tests in all the five subjects at 0.01 level of significance. Therefore, it was concluded that the treatment given by CBIP has increased the academic performance of learners in experimental groups. Hence, CBIP was effective.

### 3. Matched Group Post-Test Research Design

The third way of standardization process was through the academic performance of learners in two groups i.e. treatment and control. The matched group post-test research design was used to find out the difference between academic performances of learners taught CBIP treatment (experimental group)& traditional method of teaching (control group).The null hypothesis was formulated as there is no significant difference between academic performances among learners of experimental and control group. The t' tests were calculated for all the five subjects and the results are presented below in table 3.21.

**Table 3.21**

**Difference in Mean Academic Achievement Scores Among Learners of Experimental and Control Group**

| Subject | Group | N | Mean | SD | $SE_D$ | t' value | p-value |
|---|---|---|---|---|---|---|---|
| Science | Experimental | 17 | 21.53 | 3.91 | 1.27 | 2.46* | 0.02 |
| | Control | 17 | 18.41 | 3.48 | | | |
| English | Experimental | 18 | 19.33 | 3.46 | 1.10 | 2.68* | 0.01 |
| | Control | 18 | 16.39 | 3.13 | | | |
| Hindi | Experimental | 18 | 19.33 | 4.23 | 1.25 | 2.39* | 0.02 |
| | Control | 18 | 16.33 | 3.24 | | | |
| Social Science | Experimental | 15 | 20.20 | 5.18 | 1.70 | 1.76 | 0.09 |
| | Control | 15 | 17.20 | 4.07 | | | |
| Mathematics | Experimental | 15 | 22.33 | 4.94 | 1.61 | 2.40* | 0.02 |
| | Control | 15 | 18.47 | 3.81 | | | |
| All 5 subjects | Experimental | 83 | 20.48 | 4.40 | 0.62 | 5.09* | 0.00 |
| | Control | 83 | 17.31 | 3.57 | | | |

*significant at 0.01 level of significance

Table 3.21 shows that there was significance difference in mean academic achievement scores among learners of experimental (M = 20.48; SD = 4.40) and control group (M = 17.31; SD = 3.57) for t' (DF= 164) = 5.09, p-value=0.00. So, the null hypothesis that there is no significant difference between academic performances among learners of experimental and control group was rejected. The significance difference was also found in mean academic scores among learners of experimental and control group in Sciences, English, Hindi, and Mathematics subjects. However, no significant difference was found in mean academic scores among learners of experimental (M = 20.20; SD = 5.18) and control group (M = 17.20; SD = 4.07) for t' (DF= 28) = 1.76, p-value=0.09 in Social Science. The mean analysis reveals that mean of experimental group is higher than the mean of control group thereby indicating positive impact on academic achievement of students in experimental group. The dispersion of scores from mean is more in case of experimental group (three students scored very low) as compare to control group (five students scored more than the mean scores of experimental group). The deviation of scores in experimental group is more than the deviation of scores in traditional group. It leads the high value of standard error of difference, which ultimately lower the value of t-statistics i.e. not significant.

The overall result revealed significant effect of CBIP on academic achievement of learners; hence, paradigm was effective.

So, it was concluded that Constructive Blended Instructional paradigm was effective in preparing student teachers as well as in enhancing academic achievement of learners.

#### 3.3.1.6 Interview Schedule for School Principals or Teachers

The present study was conducted during the teaching internship of student teachers in different schools. The internship or cooperative schools acted as labs for student teachers to learn to function as teachers. The administrators and management of the schools were convinced that the purpose of this experimentation was to develop quality teachers. The principals and subject teachers acted as mentors to student teachers and observed the classes of student teachers. So, they were the potential experienced source of feedback.

The intent to conduct interviews with school principals or teachers was to get deep understanding about the overall behaviour of the student teachers. The in-depth interview schedule was prepared with open ended questions. The total 25 questions were prepared on lesson planning, knowledge construction and facilitation, technological, professional and evaluation competencies and discussed with seven experts at local and national level. The experts reviewed the questions and gave ratings to each question as “essential," "useful" or "not necessary. They advised to plan ‘how’ and ‘what’ type of questions leading to the deep enquiry. On the basis of ratings received the content validity ration of interview schedule was calculated by using Lawshe (1975) criteria for calculating Content Validity Ratio (CVR). On the basis of the qualitative suggestions and estimation of CVR quantitatively, 14 questions were retained as such, 4 questions were retained with modification and 7 statements were deleted. The table showing CVR of Interview schedule for teachers is given as Appendix (O). The final draft of the interview schedule contained 18 questions (Appendix P).

#### 3.3.1.7 Interview Schedule for Learners

The learners from classes 6$^{th}$ to 10$^{th}$ were the central point of the whole research process as the student teachers delivered their CBIP based lesson plans to them in their classrooms. Their perceptions towards teaching effectiveness of student teachers were taken through self-developed perception scale towards teaching. Although learners are actual beneficiaries and potential stakeholders yet they are immature in terms of rating the teaching of student teachers. Hence, focus group interviews were also planned with learners. The same procedure was followed to construct interview schedule for learners. The 1$^{st}$ draft of 28 questions covering all the dimensions of student perception scale was shown to 7 experts of global and national repute. On the basis of ratings received, the CVR was calculated. 12 questions were retained as such, 7 questions were retained with modification and 9 statements were deleted (Appendix Q). The deleted statements were mostly concerned with yes and no types of responses. The final draft of the interview schedule contained 19 questions (Appendix R).

## 3.4 PROCEDURE OF DATA COLLECTION

The present study was a mixed method research involving collection and analysis of quantitative and qualitative data collected from teacher education and school education. The main purpose of the study was to develop an instructional model, CBIP, for teacher preparation and evaluating its effectiveness in school education. The whole procedure of the study is presented below;

- Development and standardization of CBIP
- Development of model lesson plans based on CBIP for five school subjects i.e. Science, Mathematics, English, Social science and Hindi.
- Training of student teachers in lesson plan development and lesson delivery as per CBIP in simulated teaching.

- Development and standardization of Teaching Effectiveness Scale for student teachers and Student Perception Scale towards Teaching for learners.
- Every seventh lesson of the student teachers was observed through TES or captured through mobile. Total Five observations of student teachers were conducted. One in simulation and other four in real classrooms with learners from grades $6^{th}$ to $10^{th}$.
- The experimentation stage consisted of 50 working days corresponding to 300 hours spread over 18 schools. In total 712 hours & 15 minutes of treatment were given to learners through paradigm. In total 1221 lessons through CBIP were delivered in the classes and 175 lessons were observed by using TES scale. So, the student teachers were observed for 107 hours& 55 minutes through self or technology support. It corresponds to 18 days (6 hours a day). Personal feedback sessions were organized for student teachers.
- The school students were oriented towards desired competencies in student teachers. They filled perception scale after $2^{nd}$ and $4^{th}$ observation of student teachers.
- Total 36 focused group interviews were conducted with learners. 17 interviews were conducted after $2^{nd}$ observation and 19 interviews were conducted after $4^{th}$ observation of student teachers.
- Informal interviews were conducted with five school principals and 20 school teachers.

## 3.5 STATISTICAL TECHNIQUES

The study involved analysis of quantitative & qualitative data. The statistical techniques were used keeping in view the objectives and type of data collected to attain the objective in reference.

The first objective of the study was to develop a Constructivist Blended Instructional Paradigm. The CBIP was developed and standardized in a pilot experiment. It involved analysis of focus group discussions with experts; paired sample t' test and independent sample t' test.

The second objective of the study was to explore the effect of constructivist blended instructional paradigm on teaching effectiveness of student teachers in teacher preparation. The statistical techniques used were paired sample t' test, independent sample t' test, analysis of mean ratings of statements in TES scale, analysis (percentage & qualitative) of interviews of school teachers. The Kendall's Coefficient of Concordance was used to see the agreement of different experts on data collected through technological support. The reflective analysis and semiotic analysis methods were used to analyze the pictures/images.

The third objective of the study was to assess the effectiveness of the developed paradigm in teaching skills or competencies of student teachers through perception of school students. The paired sample t' test, analysis of mean ratings of statements of perception scale and analysis (percentage & qualitative) of focus group discussions were used as different techniques in data analysis.

Hence, paired sample t' tests, independent sample t' tests were used as quantitative data analysis techniques; mean rating analysis, interview analysis, focus group discussion, reflective analysis and semiotic analysis were used as qualitative data analysis techniques; and The Kendall's Coefficient of Concordance was used to analyse the data collected through technological support.

In the nut shell, the chapter dealt with the following in the sequential manner;

1. The present study used mixed method research approach involving convergent parallel research design.
2. The sample of the study comprised of 37 student teachers, school teachers or principals and 796 school students of $6^{th}$ to $10^{th}$ grades selected through convenience sampling.
3. Tools construction

It includes development of Constructivist Blended Instructional Paradigm, Lesson Plans based on Constructivist Blended Instructional Paradigm, Teaching Effectiveness Scale (TES) for Student Teachers, Student Perception Scale towards Teaching, Standardization of Constructivist Blended Instructional Paradigm, and Interview Schedule for School Principal/Subject Teacher, Interview Schedule for Learners

4. The data was collected through experimentation, interviews with school teachers and focus group interviews with learners.
5. Statistical Techniques like paired samples t' test and independent sample t' test; and mean rating analysis, interview analysis, focus group discussion, reflexive analysis and semiotic analysis were used as qualitative data analysis techniques.

# CHAPTER IV

# RESULTS AND DISCUSSION

**4.1 EFFECT OF CONSTRUCTIVIST BLENDED INSTRUCTIONAL PARADIGM ON TEACHING EFFECTIVENESS OF STUDENT TEACHERS IN TEACHER PREPARATION**
**4.2 EFFECT OF CBIP TREATMENT ON ACADEMIC ACHIEVEMENT OF LEARNERS**
**4.3 EFFECTIVENESS OF THE DEVELOPED PARADIGM IN TEACHING SKILLS OR COMPETENCIES OF STUDENT TEACHERS THROUGH PERCEPTION OF SCHOOL STUDENTS**
**4.4 TECHNOLOGICAL SUPPORT ANALYSIS**

# CHAPTER IV
# RESULTS AND DISCUSSION

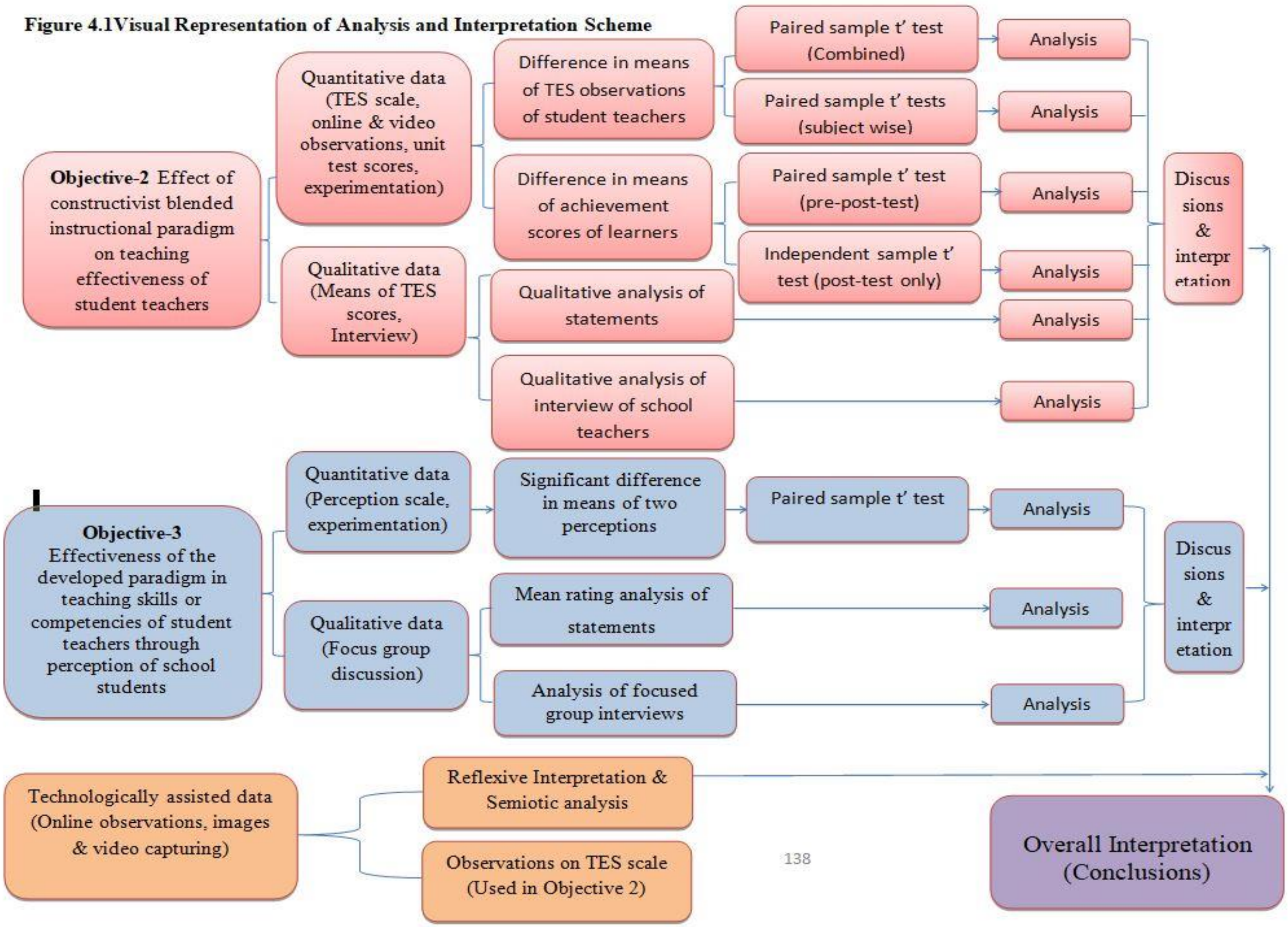
The present research was a mixed research that involved the collection and analysis of quantitative and qualitative data. The quantitative data were collected through experimentation, rating scales, and qualitative data were collected through interviews, focus group discussions, and technological support. In the preceding chapter, a detailed description of the research method and designs, sample, tools and their construction, the procedure of data collection, and statistical techniques were given. The present chapter deals with the application of suitable data analysis techniques to bring forth the empirical results. The results; thus, obtained are explained in the light of available research studies and evidences. The research intended to illustrate quantitative results with qualitative findings to develop a holistic understanding of the effectiveness of the Constructivist Blended Instructional Paradigm (CBIP). Therefore, the convergent parallel research design was used. The results of experimentation, observations, interviews, focus group discussions and video analysis are first presented separately and then they are mixed during the overall discussion and interpretation of the results. The results and their discussion and interpretation are presented as per the following objectives of this research:

1. To develop a Constructivist Blended Instructional Paradigm.
2. To explore the effect of Constructivist Blended Instructional Paradigm on Teaching Effectiveness of Student Teachers in Teacher Preparation.
3. To assess the effectiveness of the developed Paradigm in Teaching Skills or Competencies of Student Teachers through Perception of School Students.

After objective wise analysis, the technological support (videos & pictures) analysis was given to support the quantitative and qualitative inferences.

The complete figural scheme of analysis and interpretation of objectives is presented in figure 4.1.

**Figure 4.1Visual Representation of Analysis and Interpretation Scheme**



The detailed description of the process of development of Constructivist Blended Instructional Paradigm (CBIP) and its statistical standardization procedures was given under section construction of tools in the preceding chapter 'methodology'.

After the standardization of CBIP, the efficacy of paradigm was seen on teaching effectiveness of student teachers and academic achievement of learners through actual experimentation. The detail description of the same is presented under following headings;

1. Effect of constructivist blended instructional paradigm on teaching effectiveness of student teachers in teacher preparation
2. Effect of CBIP treatment on academic achievement scores of learners in school education

## 4.1 Effect of Constructivist Blended Instructional Paradigm on Teaching Effectiveness of Student Teachers in Teacher Preparation

One of the objectives of the study was 'to find out the effect of constructivist blended instructional paradigm on teaching effectiveness of student teachers'. This objective was formulated to see the effectiveness of CBIP in developing desired teaching competencies among student teachers to function as teachers. After the review of literature, a null hypothesis was formulated, which was stated as 'there is no significant effect of constructivist blended instructional paradigm on teaching effectiveness of student teachers in teacher preparation'. To test the hypothesis, data were collected through experimentation using TES scale (quantitative data), interviews with school teachers (qualitative data) and through technological support (images & videos). The details of whole experimentation are given below;

The first step was to develop model lessons based on CBIP paradigm. The researcher himself developed one lesson for each subject based on CBIP guidelines. The lesson plans along with CBIP were shown to experts. These lesson plans were considered as model lesson plans. After this, the student teachers were oriented in writing specific objectives, selecting appropriate online & offline resources and in using Wikis, WhatsApp, YouTube, Facebook, blogs, rubrics, video case studies, podcast creation & use, case study analysis, e-mails etc. in regular teaching. The researcher also gave model demonstrations on developing blends of online & offline resources. This was considered as knowledge acquisition phase of the skill.

After acquiring required knowledge about the skills, the student teachers entered in to the skill acquisition phase, i.e. in experimentation phase, where they actually practice the skills of teaching using CBIP paradigm. During experimental phase, the student teachers delivered CBIP based lesson plans to their peers in simulated teaching . The first lesson plan delivered by each student teacher was observed by the researcher through TES seven point scale. After acquiring basic level of skill proficiency in simulated teaching, the student teachers were put in to real classrooms to deliver lessons. In real classroom, i.e. in experimentation, there were challenges like group formation and technological awareness among students. The researcher was left with three options; first, to take one section of a class as experimentation group, second, to prepare groups as per level of technological awareness among learners, and third, to form groups of students on the basis of their previous records.

The situations in all 18 schools were analyzed for the formation of groups. Just to make uniformity throughout all the 18 schools & as usual practice, it was decided that one section of class would be taken by the student teacher to teach through CBIP & the other section would be taught by their regular teacher. All selected schools do not have technological resources like projectors and computers in their classroom and even they do not allow use of mobile phones in the classrooms. The discussions were held with school principals and mentors to allow the use of mobile phone in TLP. They were oriented towards the positive effects of technology uses on the achievement of learners. As discussed in standardization of CBIP (in previous chapter) equitable technological resources were created in all the three schools. The mobiles and the laptops of the student teachers were used during the teaching learning process in experimental groups. For using rotation model of blended learning use of minimum three laptops was made mandatory. In this manner all school students were provided with access to similar kind of technological resources. Another challenge was the level of pedagogical and technological awareness among learners. It was observed that learners were not fully aware with the various terminologies, new strategies and technologies uses in teaching learning process. So, the researcher oriented the learners in groups of 15-20 about the effective constructivist teaching & learning processes, learning objectives, introduction of topic, knowledge construction, online & offline resources, professional ethics of teaching, rubrics, blogs, portfolios, and characteristics of good power point presentation (Orientation programme for learners attached as Appendix S). The main purpose of orientation session was only to make learners aware about teaching skills & new technologies and not to develop skills among them.

**Details of Experimentation**

In real classrooms, each student teacher delivered 28 CBIP based lesson plans in the time period of 8 weeks. Every 7$^{th}$ lesson delivered by student teacher was observed. The details of observations are presented below in table 4.1 & 4.2

**Table 4.1**

**Number of Observations in Simulated Teaching & Real Classroom**

| Subject | No. of Observations in Simulated Teaching | No. of Observations in Real Classrooms | No. of Total Observations per subject |
|---|---|---|---|
| **English** | 3 | 12 | 15 |
| **Hindi** | 6 | 24 | 30 |
| **Maths** | 8 | 32 | 40 |
| **Social Science** | 11 | 44 | 55 |
| **Science** | 9 | 36 | 45 |
| | **37** | **158** | **185** |

The first lesson of every student teacher in simulated teaching was considered as 1$^{st}$ observation. The remaining 4 observations of every student teacher were taken in real classrooms during their teaching internship. In total, 185 observations were taken in all the five subjects (table 4.1). The table 4.2 given below further depicts that out of total 185 observations, 136 observations were personally done & 49 observations were done through technology support i.e. taken online, through video recording and captured through images. The technological, both online & offline, help was taken as it was not possible to manage lessons as per plan of action because of constraints like frequent changes in school time table & long distance among the schools taken for experimentation. These lessons captured through video and picture analysis were further given ratings on TES scale and used in data analysis.

**Table 4.2**

**Details of Observations**

| Subject | Total Observations | Observations done by Researcher | Observations done through Technology Support (Online/ Videos/Images) |
|---|---|---|---|
| **English** | 15 | 11 | 4 |
| **Hindi** | 30 | 23 | 7 |
| **Maths** | 40 | 32 | 8 |
| **Social Science** | 55 | 36 | 19 |
| **Science** | 45 | 33 | 12 |
| | **185** | **136** | **49** |

Before experimentation, the complete schedule of experimentation was planned in discussions with student teachers and time table coordinators of the schools keeping in view the time required by a student teacher to deliver 28 lessons in the real classroom. The detailed scheme and analysis of whole experimentation process is given below in table 4.3 which shows details of experimentation including the planned & actual conduction, number of days, total hours in experimentation, number of hours as input given by student teachers and the number of hours used in observation of student teachers. The column 2 is the planned experimental period which shows time period for each observation. It was planned in discussions with student teachers and time table coordinators of the schools keeping in view the time required by 37 student teachers to deliver their 1st lesson in the real classroom.

**Table 4.3**

**Details of Experimentation**

| Column-1 | Column-2 | Column-3 | Column-4 | Column-5 | Column-6 |
|---|---|---|---|---|---|
| **Observations** | **Planned Experimental Period** | **Actual Experimental Period** | **No. of Days (Hours) in Experimentation** | **Lesson Delivered (Input by 37 Student Teachers)** | **Lesson Observed (In Hours)** |
| **Observation-1** | 9th – 21st July, 2018 | 9th – 21st July, 2018 | 11 days (66 hours) | 185 lessons (107 hours& 55 min) | 37 (21 hours 39 min) |
| **Observation-2** | 7th–17th August, 2018 | 7th–20th August, 2018 | 12 days (72 hours) | 259 lessons (151hours& 5 min) | 37 (21 hours 39 min) |
| **Observation-3** | 16th-28thAugust, 2018 | 17th Aug-3rd Sept, 2018 | 13* (9) (54** hours) | 259 lessons (151 hours & 5 min) | 37 (21 hours 39 min) |
| **Observation-4** | 27th-6thSept, 2018 | 19th Sept- 5th Oct, 2018 | 13 days (78 hours) | 259 lessons (151hours) | 37 (21 hours 39 min) |
| **Observation-5** | 19th- 2ndOct, 2018 | 27th Sept-12th Oct, 2018 | 10*** (5) 30 hours | 259 lessons (151 hours & 5 min) | 37 (21 hours 35 min) |
| | | | 50 days (6 hours a day, 300 hours) | 1221 lessons (712 hours 15 min by all 37 students) | 108 hours 15 min(18 days @ 6 hours a day) |

*4 days overlapping with 2nd Observation **24 hours overlapping with 2nd observation

***5 days overlapping with 4th Observation ****30 hours overlapping with 4th Observation

Likewise time period for remaining four observations with the gap of time required to deliver six lessons in successive observations was planned. It was because researcher has planned to observe every 7$^{th}$ lesson of the student teachers. The minor deviation in 2$^{nd}$& 3$^{rd}$ observations was due to the day to day changes and unexpected holidays in schools.

The wide gap in planning and actual experimentation in 4$^{th}$ observation was because of exam period. And the exam period varies with the school. The column 4 shows the number of days & corresponding hours of experimentation for each student teacher. The four days of 3$^{rd}$ observation overlaps with 2$^{nd}$ observation & 5 days of 5$^{th}$ observation overlaps with 4$^{th}$ observation. This is because of contextual changes in the school operations.

The one day corresponds to the 6 hours of experimentation. The column 5 shows the number of lessons delivered by student teachers. This is the actual input (teaching through CBIP) given to learners by all 37 student teachers. The column 6 shows hours of observation done by supervisor through self or technology support.

From description given above, it is summarized that the experiment was run in 18 schools for 50 working days equivalent to 300 hours. In total 712 hours & 15 minutes of treatment were given to learners through CBIP paradigm. In total 1221 lessons through CBIP were delivered in the classes and 175 lessons were observed by using TES scale (Appendix J). So, the student teachers were observed for 108 hours& 15 minutes through self or technology support. It corresponds to 18 days & 15 minutes (6 hours a day). In this way quantitative data were collected. In addition to this, the informal interviews of school teachers were also conducted twice regarding the performance of the student teachers.

To test the hypothesis whether there is significant effect of constructivist blended instructional paradigm on teaching effectiveness of student teachers in teacher preparation or not, the qualitative & quantitative data thus collected was analysed in following ways:

1. Effect of constructivist blended instructional paradigm on teaching effectiveness of student teachers

a) Effect of constructivist blended instructional paradigm on teaching effectiveness of student teachers teaching English
b) Effect of constructivist blended instructional paradigm on teaching effectiveness of student teachers teaching Hindi
c) Effect of constructivist blended instructional paradigm on teaching effectiveness of student teachers teaching Mathematics
d) Effect of constructivist blended instructional paradigm on teaching effectiveness of student teachers teaching Social Science
e) Effect of constructivist blended instructional paradigm on teaching effectiveness of student teachers teaching Science

2. Analysis of mean ratings given in TES scale to trace out the changes in teaching effectiveness after every observation, and to plan remedial sessions for providing needed feedback.
3. Interview analysis of school teachers

### 4.1.1 Effect of Constructivist Blended Instructional Paradigm on Teaching Effectiveness of Student Teachers

As discussed above, each student teacher was observed for 5 times during the process of experimentation. The pre-post research design was used to test the null hypothesis i.e. there is no significant effect of CBIP on teaching effectiveness of student teachers in all five subjects; English, Hindi, Mathematics, Social Science and Science. In other words it can be formulated as means of observation 1 and 5 are equal. The data were examined for normality and presence of outliers. As the data was found normal and without outliers, a paired-samples t' test was performed to determine the effect of CBIP treatment on the teaching effectiveness of student teachers of experimental group. The results; thus, obtained are shown in table 4.4 given below;

**Table 4.4**

**Difference in Mean Teaching Effectiveness Scores of Student Teachers in Experimental Group**

| Pair | Observation | N | Mean | SD | $SE_D$ | t' value | p-value |
|---|---|---|---|---|---|---|---|
| Pair 1 | Observation 1 | 37 | 246.19 | 40.45 | 6 | 1.01 | 0.31 |
| | Observation 2 | 37 | 240.11 | 41.14 | | | |
| Pair 2 | Observation 2 | 37 | 240.11 | 41.14 | 3.22 | 10.67* | 0.00 |
| | Observation 3 | 37 | 274.49 | 41.19 | | | |
| Pair 3 | Observation 3 | 37 | 274.49 | 41.19 | 3.75 | 8.05* | 0.00 |
| | Observation 4 | 37 | 304.65 | 33.55 | | | |
| Pair 4 | Observation 4 | 37 | 304.65 | 33.55 | 4.31 | 4.18* | 0.00 |
| | Observation 5 | 37 | 322.70 | 36.90 | | | |
| Pair 5 | Observation 1 | 37 | 246.19 | 40.45 | 6.75 | 11.34* | 0.00 |
| | Observation 5 | 37 | 322.70 | 36.90 | | | |

*significant at 0.01 level of significance

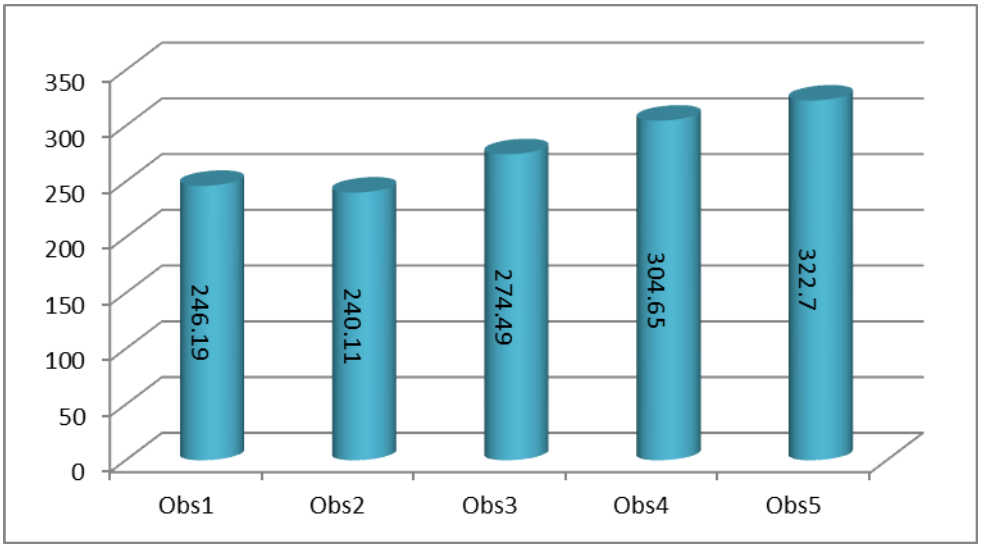
In the table 4.4 the t'-values shows that there is no significant difference between observation 1 & 2 (i.e. pair 1). But in all others pairs (pairs 2, 3, 4 & 5) there exists a significant difference. As per the design of the study, the difference between observation 1 & 5 (pre-post-test) was of significance to explain the impact of paradigm on teaching competencies of student teachers.

Table 4.4 shows that there is a significant difference between observation 1(M=246.19; SD=40.45) and observation 5 (M=322.70; SD=36.90), t (DF=36) = 11.34, p-value =0.00.So, the null hypothesis that there is no significant effect of CBIP on teaching effectiveness of student teachers was rejected.

The observations at different times reveal incremental change in the teaching behaviour of student teachers. The visual representation of incremental change in the behaviour of student teachers is given in figure 4.2.

**Figure 4.2**

**Means Teaching Effectiveness Scores with respect to Different Observations**




The positive incremental change in the teaching behaviour of student teachers (from observation 2 to observation 5) further reveals that developed paradigm develops teaching competencies among student teachers. The decrease in the teaching effectiveness of student teachers from observation 1 to 2 is because of new or less familiar conditions, new real learners and other anxieties of the real classrooms. It is concluded that there is significant effect of constructivist blended instructional paradigm on teaching effectiveness of student teachers in teacher preparation. To draw deep and specific conclusions, the effectiveness of paradigm on teaching effectiveness of student teachers teaching individual subjects was also studied separately as follow;

#### 4.1.1.1 Effect of Constructivist Blended Instructional Paradigm on Teaching Effectiveness of Student Teachers Teaching English

In the teaching learning process of English, 15 lessons (refer to table 4.1 on page 143) of student teachers teaching in three different schools were observed in the experimentation process. A paired-samples t' test was performed to find out the effect of CBIP on teaching effectiveness of student teachers in English. The details are given in table 4.5

**Table 4.5**

**Difference in Mean Teaching Effectiveness Scores of Student Teachers Teaching English**

| Pair | Observation | N | Mean | SD | $SE_D$ | t' value | p-value |
|---|---|---|---|---|---|---|---|
| Pair 1 | Observation 1 | 3 | 230.67 | 32.52 | 18.750 | 0.61 | 0.60 |
| | Observation 2 | 3 | 242 | 47.66 | | | |
| Pair 2 | Observation 2 | 3 | 242 | 47.66 | 6.69 | 6.67* | 0.02 |
| | Observation 3 | 3 | 286.67 | 36.09 | | | |
| Pair 3 | Observation 3 | 3 | 286.67 | 36.09 | 13.30 | 1.93 | 0.19 |
| | Observation 4 | 3 | 312.33 | 20.60 | | | |
| Pair 4 | Observation 4 | 3 | 312.33 | 20.60 | 11.29 | 1.12 | 0.38 |
| | Observation 5 | 3 | 325 | 40.15 | | | |
| Pair 5 | Observation 1 | 3 | 230.67 | 32.52 | 4.81 | 19.62* | 0.00 |
| | Observation 5 | 3 | 325 | 40.15 | | | |

*significant at 0.01 level of significance

Table 4.5 reveals that there exists no significant difference in observation 1 & 2, observation 3 & 4 and observation 4 & 5. This is also attributed to the fact that human behavior change process is slow. It needs repetitive practice. In English subject, seven lessons or 7 days gap was too small to make any modification in teaching effectiveness of student teachers. So, no significant differences emerged. However, where ever practice time and gap was enhanced, the effect of use and practice was reflected. This can be seen through significant difference in observation 2 & 3; observation 1 & 5. The significant difference in observation 2 & 3 signifies that inner modification in terms of feedback too has modified the behavior.

As per the pre-post test design of the study, the significant difference between observation 1 (M=230.67; SD=32.52) and observation 5 (M=325; SD=40.15) shows that the treatment of 50 days (300hours) was effective as it resulted in increase in teaching effectiveness of student teachers in English subject. A paired-samples t' test found this difference to be significant at (DF=2) = 19.62, p-value =0.00.

From quantitative analysis, it is further assumed that the practice, time and feedback have played an important role in increasing the teaching effectiveness of student teachers. So, there was a significant effect of constructivist blended instructional paradigm on teaching effectiveness of student teachers teaching English.

#### 4.1.1.2 Effect of Constructivist Blended Instructional Paradigm on Teaching Effectiveness of Student Teachers Teaching Hindi

In teaching learning process of Hindi, the teaching of 6 student teachers was observed in 5 different schools. Total of 30 observations (refer to table 4.1 on page 143) through TES scale were conducted. A paired-samples t' test was used to find out the effect of CBIP on teaching effectiveness of student teachers in Hindi. The results of paired-samples t' test are given below in table 4.6.

**Table 4.6**

**Difference in Mean Teaching Effectiveness Scores of Student Teachers Teaching Hindi**

| Pair | Observation | N | Mean | SD | $SE_D$ | t' value | p-value |
|---|---|---|---|---|---|---|---|
| Pair 1 | Observation 1 | 6 | 233.17 | 47.40 | 12.16 | 1.48 | 0.20 |
| | Observation 2 | 6 | 215.17 | 41.14 | | | |
| Pair 2 | Observation 2 | 6 | 215.17 | 41.14 | 8.52 | 4.57* | 0.00 |
| | Observation 3 | 6 | 254.17 | 33.24 | | | |
| Pair 3 | Observation 3 | 6 | 254.17 | 33.24 | 5.32 | 7.20* | 0.00 |
| | Observation 4 | 6 | 292.50 | 30.60 | | | |
| Pair 4 | Observation 4 | 6 | 292.50 | 30.60 | 4.43 | 7.29* | 0.00 |
| | Observation 5 | 6 | 324.83 | 32.28 | | | |
| Pair 5 | Observation 1 | 6 | 233.17 | 47.40 | 13.84 | 6.62* | 0.00 |
| | Observation 5 | 6 | 324.83 | 32.28 | | | |

*significant at 0.01 level of significance

The paired-samples t' test analysis shows no significant difference between observation 2 & observation1 (in pair one) but in all others pairs there exist a significant difference. It is because, while learning a skill, initial phase is marked with high inputs, efforts and low output or slow increase in skill. This happened in this case also.

However, from table 4.6, it is clear that there is significant difference between observation 1 (M=233.17; SD=47.40) and observation 5 (M=324.83; SD=32.28) where t (DF=5) = 6.62, p-value=0.00. So, the null hypothesis that means of observation 1 and observation 5 are equal, was rejected in teaching of Hindi.

So, there is significant effect of constructivist blended instructional paradigm on teaching effectiveness of student teachers teaching Hindi.

#### 4.1.1.3 Effect of Constructivist Blended Instructional Paradigm on Teaching Effectiveness of Student Teachers Teaching Mathematics

A paired-samples t' test was performed to determine the effect of CBIP treatment on the teaching effectiveness of 8 student teachers in Mathematics. The results are shown in table 4.7 given below;

**Table 4.7**

**Difference in Mean Teaching Effectiveness Scores of Student Teachers teaching Mathematics**

| Pair | Observation | N | Mean | SD | $SE_D$ | t' value | p-value |
|---|---|---|---|---|---|---|---|
| Pair 1 | Observation 1 | 8 | 240.87 | 40.20 | 14.44 | 0.28 | 0.79 |
| | Observation 2 | 8 | 244.87 | 44.95 | | | |
| Pair 2 | Observation 2 | 8 | 244.87 | 44.95 | 8.18 | 3.23* | 0.01 |
| | Observation 3 | 8 | 271.25 | 39.10 | | | |
| Pair 3 | Observation 3 | 8 | 271.25 | 39.10 | 6.26 | 3.79* | 0.00 |
| | Observation 4 | 8 | 295 | 37.77 | | | |
| Pair 4 | Observation 4 | 8 | 295 | 37.77 | 9.37 | 1.24 | 0.25 |
| | Observation 5 | 8 | 306.62 | 36.50 | | | |
| Pair 5 | Observation 1 | 8 | 240.87 | 40.20 | 12.84 | 5.12* | 0.00 |
| | Observation 5 | 8 | 306.62 | 36.50 | | | |

*significant at 0.01 level of significance

Table shows no significant difference between observation 1&2 and observation 4 & 5. There is a significant difference between observation 1 (M=240.87; SD=40.20) and observation 5 (M=306.62; SD=36.50) as t(DF=7)=5.12, p-value= 0.00.The null hypothesis that there is no significant effect of CBIP on teaching effectiveness of student teachers teaching mathematics subject was rejected.

So, there is a significant effect of constructivist blended instructional paradigm on teaching effectiveness of student teachers teaching Mathematics.

#### 4.1.1.4 Effect of Constructivist Blended Instructional Paradigm on Teaching Effectiveness of Student Teachers Teaching Social Science

As discussed earlier in table 4.1(refer to page 143), total 55 observations were conducted in teaching learning process of Social Science. Out of these, 36 observations were personally observed face to face and 19 observations were captured through technology support, mostly through online observations and pictures. A paired-samples t' test was used to find out the effect of CBIP on teaching effectiveness of student teachers in Social Science. The details are given below in table 4.8

**Table 4.8**

**Difference in Mean Teaching Effectiveness Scores of Student Teachers Teaching Social Science**

| Pair | Observation | N | Mean | SD | $SE_D$ | t' value | p-value |
|---|---|---|---|---|---|---|---|
| Pair 1 | Observation 1 | 11 | 236.27 | 44.44 | 12.41 | 0.41 | 0.69 |
| | Observation 2 | 11 | 231.18 | 35.90 | | | |
| Pair 2 | Observation 2 | 11 | 231.18 | 35.90 | 6.03 | 4.48* | 0.00 |
| | Observation 3 | 11 | 258.18 | 38.01 | | | |
| Pair 3 | Observation 3 | 11 | 258.18 | 38.018 | 9.03 | 3.89* | 0.00 |
| | Observation 4 | 11 | 293.27 | 29.84 | | | |
| Pair 4 | Observation 4 | 11 | 293.27 | 29.84 | 8.95 | 2.32** | 0.04 |
| | Observation 5 | 11 | 314 | 33.74 | | | |
| Pair 5 | Observation 1 | 11 | 236.27 | 44.44 | 15.60 | 4.98* | 0.00 |
| | Observation 5 | 11 | 314 | 33.74 | | | |

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

Table 4.7 shows no significant difference between observation 1 & 2 but in all other pairs there is a significant difference. The difference between observation 1 (M=236.27; SD=44.44) and observation 5 (M=314; SD=33.74) is found to be significant as t (DF=10) = 4.98, p-value=0.00. So, the null hypothesis that there is no significant effect of CBIP on teaching effectiveness of student teachers teaching social sciences was rejected.

So, there is significant effect of constructivist blended instructional paradigm on teaching effectiveness of student teachers teaching Social sciences.

#### 4.1.1.5 Effect of Constructivist Blended Instructional Paradigm on Teaching Effectiveness of Student Teachers Teaching Science

A paired-samples t' test was performed to find out the effect of CBIP on teaching effectiveness of 9 student teachers teaching Science. The details are given in table 4.9.

**Table 4.9**

**Difference in mean Teaching Effectiveness Scores of Student Teachers Teaching Sciences**

| Pair | Observation | N | Mean | SD | $SE_D$ | t' value | p-value |
|---|---|---|---|---|---|---|---|
| Pair 1 | Observation 1 | 9 | 276.89 | 19.28 | 11.62 | 1.21 | 0.26 |
| | Observation 2 | 9 | 262.78 | 37.88 | | | |
| Pair 2 | Observation 2 | 9 | 262.78 | 37.88 | 4.14 | 10.64* | 0.00 |
| | Observation 3 | 9 | 306.78 | 39.51 | | | |
| Pair 3 | Observation 3 | 9 | 306.78 | 39.51 | 7.82 | 3.31* | 0.01 |
| | Observation 4 | 9 | 332.67 | 26.92 | | | |
| Pair 4 | Observation 4 | 9 | 332.67 | 26.92 | 10.37 | 1.23 | 0.25 |
| | Observation 5 | 9 | 345.44 | 39.19 | | | |
| Pair 5 | Observation 1 | 9 | 276.89 | 19.28 | 14.39 | 4.76* | 0.00 |
| | Observation 5 | 9 | 345.44 | 39.19 | | | |

*significant at 0.01 level of significance

The paired-samples t' test analysis shows that there exists no significant difference between observation 1 & 2 and observation 3 & 4, but in all others pairs (pairs 2, 4 & 5) there exist a significant difference. Table 4.9shows that the difference between observation 1(M=276.89; SD=19.28) and observation 5 (M=345.44; SD=39.19) is significant for t (DF=8) = 4.76, p-value=0.00. So, the null hypothesis that there is no significant difference between observation 1 and observation 5 was rejected.

So, the means of the both observations are not equal and there was significant effect of constructivist blended instructional paradigm on teaching effectiveness of student teachers teaching sciences.

## Discussion

The paired-samples t' test results revealed that there was a significant effect of Constructivist Blended Instructional Paradigm on teaching effectiveness of student teachers in teacher preparation. There was a significant difference in mean teaching effectiveness scores of student teachers teaching English, Hindi, Mathematics, Social Science and Science (table 4.10).

**Table 4.10**

**Difference in Mean Teaching Effectiveness Scores of Student Teachers**

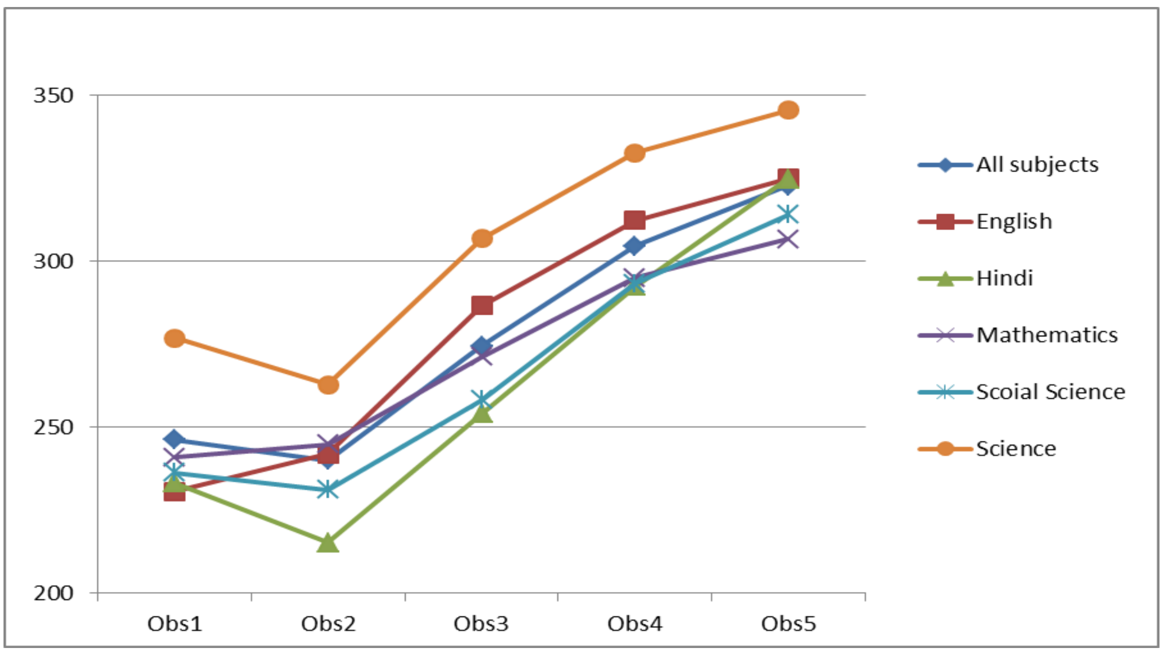
| Subject | Observation | N | Mean | SD | $SE_D$ | t' value | p-value |
|---|---|---|---|---|---|---|---|
| English | Observation 1 | 3 | 230.67 | 32.52 | 4.81 | 19.62* | 0.00 |
| | Observation 5 | 3 | 325 | 40.15 | | | |
| Hindi | Observation 1 | 6 | 233.17 | 47.40 | 13.84 | 6.62* | 0.00 |
| | Observation 5 | 6 | 324.83 | 32.28 | | | |
| Maths | Observation 1 | 8 | 240.87 | 40.20 | 12.84 | 5.12* | 0.00 |
| | Observation 5 | 8 | 306.62 | 36.50 | | | |
| Social Science | Observation 1 | 11 | 236.27 | 44.44 | 15.60 | 4.98* | 0.00 |
| | Observation 5 | 11 | 314 | 33.74 | | | |
| Science | Observation 1 | 9 | 276.89 | 19.28 | 14.39 | 4.76* | 0.00 |
| | Observation 5 | 9 | 345.44 | 39.19 | | | |
| Overall | Observation 1 | 37 | 246.19 | 40.45 | 6.75 | 11.34* | 0.00 |
| | Observation 5 | 37 | 322.70 | 36.90 | | | |

*significant at 0.01 level of significance

From periodic analysis of observations, it was further found that there was decrease in means of teaching effectiveness scores from observtaion1 to 2 and difference was not significant in all the five subjects under study. The figure 4.3 given below shows the trend of means of teaching effectiveness scores of student teachers in all five subjects with respect to different observations. The psychological rationale behind the significance difference may be attributed to the laws of learning. With the increase in time, there is increase in practice. The law of exercise (use & disuse), law of effect has played important role in the experimentation. Besides these, the law of reinforcement also occurred in some cases. So the role of supervisory feedback is important. The significant difference between observation 1 and 5 shows that there is significant effect of constructivist blended instructional paradigm on teaching effectiveness of student teachers.

**Figure 4.3**

**Means Teaching Effectiveness Scores with respect to Different Observations**




Similar to these results, Gulbahar (2008) found improvement in technology integration skills of prospective teachers in Mathematics, Biology and Chemistry through practice.

Singer & Stoicescu (2010) found significant impact of blended learning as a tool to strengthen teaching competencies in master level teacher training programme. Isman, Abanmy, Hussain & Al Saadany (2012) found effectiveness of blended learning approach in developing teaching skills among student teachers in Mathematics and Science. Ali and Mishra (2014) found that Web 2.0 tools like Wikis, blogs and other social media has potential to provide constructive learning opportunities for learners which can support inquiry, creativity, critical reflection and dialogue. With technology (synchronous and asynchronous) integration in constructivism, a teacher can develop Higher Order Thinking skills like critical thinking, problem solving, decision making, argumentation, reasoning skills and creativity, among learners.

Nasrin and Varshney (2014) found that prospective teachers perceived social networking websites like discussion forum, Facebook, YouTube, Wikis, Blogs, Flickr, Twitter, linkdln as effective tools for learning. Hernandez-Ramos (2005) found that in addition to technological factors, contextual and personality factors also play very important role in technology integration decisions and applications.

In contrast to these findings, Bielefeldt, 2001; Willis & Montes, 2002; Doering, Hughes & Huffman, 2003; Wang, Ertmer & Newby, 2004 found that pre-service teachers are not ready to integrate technology into teaching practice or learning processes and the vision, skills, knowledge, and departmental culture are the barriers in integration of technology into teachers' education courses (Finley and Hartman, 2004). Similar to these findings, Koh, Chai and Tsai (2010), found that in actual implementation in classes prospective teachers faced issues like lack of time and reserving technology for their classes.

In nut shell, the quantitative analysis revealed significant effect of constructivist blended instructional paradigm on teaching effectiveness of student teachers in teacher preparation. However, empirical evidences also revealed no significant difference between observation 1 & 2. The qualitative analysis of mean ratings given in TES scale was performed to trace out the changes in teaching effectiveness after every observation, and to plan remedial sessions for providing needed feedback. The detailed description of the same is as follow.

### 4.1.2 Analysis of Mean Ratings

The gradual progression of teaching competencies among student teachers was seen through qualitative analysis to compare and support quantitative inferences and to find out the rationale for non-significant & significant differences to establish internal validity of treatment variable.

The synthetic indexes were constructed to summarize in a single score the scores of different indicators of each dimension. The details are given in table 4.11 (given on page 161). The synthetic indexes show a slight increase in LPC (from 3.98 to 4.03), TC (from 4.17 to 4.35) and PC(from 3.89 to 3.90) dimensions. The decrease in mean ratings was observed in KCFC (from 4.13 to 4.01) and EC (from 3.94 to 3.43) which indicates that in observation 2, student teachers performed poorly in KCFC indicators like topic exploration, use of resources, content mastery, facilitator role, teaching style, using constructivist approach, holistic instruction, higher order skills, engagement, exploration, explanation, board work, elaboration skills, questioning, teaching strategies, stimulus variation; and in EC indicators like in closure of lesson, recapitulation, CCE practices, technology use, one line evaluations, variety of assessment techniques, homework, and assignments.

The overall mean score of TES dimensions has also decreased from observation1 (M=4.02) to observation2 (M=3.94).

The further analysis of mean ratings of each statement shows that there is dip in ratings from 1$^{st}$ to 2$^{nd}$ observation in following indicators of teaching effectiveness.

1. Encouraging students to use their personal devices (cell phone, mp3 player, Audio) in learning,
2. Giving freedom to students to work at their own,
3. Planning relevant educational activities as per level of students,
4. Creating situations that encourage students to assume responsibility,
5. Establishing the climate of open mindedness & mutual trust,
6. Distributing relevant reading material to students,
7. Planning open ended questions to motivate students & facilitate discussions,

8. Using both traditional face-to- face and on–line learning resources,
9. Handling students' queries effectively,
10. Accepting accountability for mistakes committed,
11. Using variety of instructional & ICT resources to enrich students' learning experiences,
12. Handling synchronous teaching learning resources effectively,
13. Showing proper coordination between verbal & nonverbal behavior,
14. Using blends of traditional & on line learning resources in lesson development,
15. Discussing case studies/projects as strategies to sensitize students about community,
16. Assessing the previous knowledge of students through activities,
17. Designing variety of creative assignments to assess learning in students,
18. Diagnosing students' learning difficulties,
19. Encouraging students to share their real life experiences to promote discussions,
20. Showing pleasing and apt gestures,
21. Creating appropriate blend of resources suitable to context, content and learner,
22. Designing objectives as per need of students & subject,
23. Posing analytical questions to promote critical thinking skills.

After analysing the causes, discussions were held with student teachers and their mentors (school subject teachers). It was found that, school subject teachers had given clear instructions to maintain discipline, to cover content only from book, not giving freedom to learners, no exposure to new technologies etc. As the CBIP lesson plans mainly focused upon blended learning strategies, the restrictions on technology uses imposed by schools has impacted the other dimensions negatively.

After exploring causes of decrease in teaching competencies in 2$^{nd}$ observation & discussions with subject teachers it was found that they were governed by traditional norms. All these are due to their traditional mental set up like do switch off mobiles & authoritarian attitude of teachers for maintaining pin drop silence etc. in the classroom. Although, some of the school teachers verbally supported the experimentation, the fixed behaviour of others towards various school practices was a challenge to the experimentation. Moreover, sudden changes cannot come overnight in the traditional set up-norms in the traditional classroom. After the discussions, it was concluded that, there was a need to orient subject teachers about new technologies & their impact on classroom pedagogies. So, one to one feedback sessions were organized with school subject teachers &student teachers. The student perception scale was also administered on learners and remedial discussions were held.

**Remedial Session**

In feedback & remedial sessions with student teachers it was found that they have emphasized more on technology & ignored the pedagogies. This qualitative inference further supported the synthetic index analysis which showed slight increase in TC dimension. In the remedial sessions the training was given on technological, knowledge construction & facilitation and evaluation competencies. The student teachers were trained in formulation of specific objectives as per revised and digital bloom taxonomy; selection of pedagogical techniques before selection of technological resources, both off line & online; creating appropriate blend of resources suitable to context, content and learner; creation of opportunities for learners to work in collaborations with freedom & accountability; & in using case studies from society in the teaching learning process.

The school teachers were oriented towards benefits of new technologies & constructive pedagogies. They were persuaded to allow student teachers to teach as per their planning. The school teachers were having a hidden fear that student teachers set high teaching standards during their internship & school authorities demand same standards of teaching from them after the completion of teaching internship.

The synthetic indexes for observation 5 shows a descending order of teaching competence development i.e. LPC>KCFC>TC>PC>EC (table 4.11).The comparative analysis of mean scores of TES dimensions between observation 1 and 5 shows that the student teachers improved in TES dimensions in following descending order as follow; LPC (1.52) > PC (1.38) > KCFC (1.23) > TC (1.15) > EC (1.03).

**Table 4.11: Mean and Standard Deviation of Each Dimension belonging to TES Scale (Observation wise)**

| Dimension | N | Observation 1 | | Observation 2 | | Observation 3 | | Observation 4 | | Observation 5 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Mean | SD | Mean | SD | Mean | SD | Mean | SD | Mean | SD |
| **LPC** | **37** | 3.98 | 0.90 | 4.03 | 0.85 | 4.64 | 0.98 | 5.13 | 0.80 | 5.50 | 0.83 |
| **KCFC** | **37** | 4.13 | 0.89 | 4.01 | 0.92 | 4.53 | 0.92 | 5.08 | 0.77 | 5.36 | 0.79 |
| **TC** | **37** | 4.17 | 0.97 | 4.35 | 1.07 | 4.89 | 1.07 | 5.10 | 0.91 | 5.32 | 0.95 |
| **PC** | **37** | 3.89 | 0.88 | 3.90 | 0.93 | 4.44 | 0.92 | 4.95 | 0.82 | 5.27 | 0.86 |
| **EC** | **37** | 3.94 | 0.93 | 3.43 | 1.08 | 4.11 | 0.98 | 4.65 | 0.92 | 4.97 | 1.09 |
| **TES** | **37** | 4.02 | 0.91 | 3.94 | 0.97 | 4.52 | 0.97 | 4.98 | 0.84 | 5.28 | 0.90 |

**Table 4.12: Mean and Standard Deviation of Each Dimension belonging to TES Scale (Subject wise for 5th Observation)**

| Dimension | N | English | | Hindi | | Mathematics | | Social Science | | Sciences | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Mean | SD | Mean | SD | Mean | SD | Mean | SD | Mean | SD |
| **LPC** | **37** | 5.42 | 0.74 | 5.31 | 0.57 | 5.13 | 0.81 | 5.24 | 0.76 | 6.29 | 0.63 |
| **KCFC** | **37** | 5.61 | 0.56 | 5.27 | 0.79 | 5.19 | 0.73 | 5.23 | 0.74 | 5.62 | 0.80 |
| **TC** | **37** | 5.29 | 0.77 | 5.50 | 0.94 | 4.88 | 0.90 | 5.31 | 1.02 | 5.63 | 0.94 |
| **PC** | **37** | 5.11 | 0.97 | 5.50 | 0.73 | 5.10 | 0.77 | 5.11 | 0.82 | 5.52 | 0.94 |
| **EC** | **37** | 4.87 | 0.93 | 5.13 | 0.74 | 4.56 | 1.15 | 4.80 | 1.14 | 5.46 | 1.12 |
| **TES** | **37** | 5.26 | 0.79 | 5.34 | 0.75 | 4.97 | 0.87 | 5.14 | 0.90 | 5.70 | 0.89 |

The comparative analysis of means scores of indicators between observations 1 & 5 showed maximum improvement in following indicators:

1. Giving freedom to students to work at their own
2. Developing objectives for all the three domains of development
3. Designing objectives as per need of students & subject
4. Establishing the climate of open mindedness & mutual trust
5. Encouraging students to ask questions
6. Distributing relevant reading material to students
7. Encourages students to use their personal devices (cell phone, mp3 player, audio) in learning
8. Creating situations that encourage students to assume responsibility
9. Handling students' disruptive behavior appropriately
10. Planning relevant educational activities as per level of students.

The skills which developed least among the student teachers were as below:

1. Involving students in organization of teaching learning resources
2. Using asynchronous teaching learning resources (e-mail, wikis, Facebook etc.) appropriately
3. Employing rubrics to evaluate the performance of students
4. Giving creative assignments in home work
5. Ensuring neatness & correctness in the board work
6. Not screaming at students
7. Informing learners about the expected outcomes from the lesson
8. Giving clear and precise instructions
9. Employing various formative assessment practices
10. Using on-line resources (like online quiz, blogs etc.) in assessment.

The synthetic indexes were also constructed for each dimension of TES for individual subject under study as shown in table 4.12. It shows that after observation 5, the order of improvement in teaching effectiveness of student teachers is as below;

Science (5.70) > Hindi (5.34) > English (5.26) > Social Science (5.14) > Maths (4.97)

The subject wise analysis of mean ratings (table 4.12) of dimensions of TES shows following trends;

For teaching of English: KCFC >LPC > TC > PC > EC

For teaching of Hindi: TC = PC >LPC > KCFC > EC

For teaching of Maths: KCFC >LPC >PC >TC > EC

For teaching of Social Science: TC >LPC > KCFC > PC > EC

For teaching of Science: LPC >TC >KCFC > PC > EC

After 712 hours & 15 minutes of treatment to learners, and 108 hours& 15 minutes observation of student teachers in the experimentation, the skills which developed least as compared to others are giving clear direction, informing students about expected outcomes, use of e-mail, wikis, Facebook in learning process, board work, formative assessment techniques, using rubrics &online quizzes, blogs in evaluation, and giving creative assignments. So, Evaluation Competence was least developed in student teachers for all the five subjects under study.

The levels of teaching effectiveness among student teachers were also compared to analyse the improvement in their teaching competencies. Table 4.13 shows the distribution of student teachers in different levels of teaching effectiveness.

**Table 4.13**

**Distribution of Student Teachers in different Levels of Teaching Effectiveness**

| Level of Teaching | Observation 1<br>N (%) | Observation 5<br>N (%) |
|---|---|---|
| **High Level (323 & Above)** | 0 (0%) | 18 (48.6%) |
| **Above Average (302-323)** | 1 (2.7%) | 6 (16.2%) |
| **Average Level (290-302)** | 4 (10.8%) | 6 (16.2%) |
| **Moderate Level (249-290)** | 14 (37.8%) | 6 (16.2%) |
| **Low Level (Below 249)** | 18 (48.6%) | 1(2.7%) |

After observation 1, around 48.6% student teachers were having low level and 37.8% were having moderate level of teaching effectiveness. But after observation 5, 48.6% student teachers were having high level of teaching effectiveness.

The table 4.14 shows the distribution of student teachers in different levels of teaching effectiveness.

**Table 4.14**

**Distribution of Student Teachers in different Level of Teaching Effectiveness (Subject Wise)**

| **Subject →** | **English** | | **Hindi** | | **Maths** | | **Social Science** | | **Science** | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Level ↓** | **Obs. 1** | **Obs. 5** | **Obs. 1** | **Obs. 5** | **Obs. 1** | **Obs. 5** | **Obs. 1** | **Obs. 5** | **Obs. 1** | **Obs. 5** |
| **High Level (323 & Above)** | 0 | 1 | 0 | 4 | 0 | 2 | 0 | 5 | 0 | 6 |
| **Above Average (302-323)** | 0 | 1 | 0 | 0 | 0 | 2 | 0 | 1 | 1 | 2 |
| **Average Level (290-302)** | 0 | 0 | 1 | 1 | 1 | 2 | 1 | 3 | 1 | 0 |
| **Moderate Level (249-290)** | 1 | 1 | 1 | 1 | 2 | 1 | 4 | 2 | 6 | 1 |
| **Low Level (Below 249)** | 2 | 0 | 4 | 0 | 5 | 1 | 6 | 0 | 1 | 0 |
| **Total** | 3 | 3 | 6 | 6 | 8 | 8 | 11 | 11 | 9 | 9 |

Table 4.14 shows in observation 1, except in Science subject, maximum student teachers were having low level of teaching effectiveness. The order of improvement in level of teaching effectiveness of student teachers as given below;

Science > Hindi > English > Social Science > Maths

The same trend was found in synthetic indexes for each dimension of TES for individual subject. Further it was found that sixteen student teachers out of 37 under study have secured their job placements in reputed schools during or just after the session.

**Findings**

1. The synthetic indexes show that after observation 1 there is a slight increase in Lesson Planning and Technological Competencies of student teachers and decrease in mean ratings was observed in Knowledge Construction &Facilitation and Evaluation Competencies. The overall mean score of TES dimensions have also decreased from observation 1 (M=4.02) to observation 2 (M=3.94).
2. After the observation 5, the student teachers developed competencies of teaching effectiveness in descending order i.e. LPC > KCFC > TC > PC > EC. So, there is maximum development in Lesson Planning Competence and least in Evaluation Competence.
3. The comparative analysis of mean scores of TES dimensions between observation 1 and 5 shows that the student teachers improved in TES dimensions in following descending order as follow; LPC (1.52) > PC (1.38) > KCFC (1.23) > TC (1.15) > EC (1.03). Again, the maximum improvement is in Lesson Planning Competence and least in Evaluation Competence.
4. After the experimentation, the student teachers teaching Sciences has developed maximum teaching effectiveness and those teaching Maths has developed least. The descending order of teaching effectiveness is as follow; Science (5.70) > Hindi (5.34) > English (5.26) > Social Science (5.1) >Maths (4.97)
5. The student teachers teaching Hindi and Social science showed maximum development in Technological Competencies.
6. The student teachers teaching English and Maths showed maximum development in Knowledge Construction &Facilitation Competencies.
7. The student teachers teaching Science showed maximum development in Lesson Planning Competencies.

8. Evaluation Competence was least developed in student teachers teaching all the five subjects under study.
9. The level of teaching effectiveness in student teachers has increased. Around 49% of student teachers were having high level of teaching effectiveness. This has helped students in securing job placement.

The informal interviews were also conducted with the school teachers and the principals of the experimenting schools to discuss the progress of student teachers. These teachers and principals acted as the subject mentors to student teachers. The personal one to one interviews were conducted with five school principals and 20 school teachers. The analysis of the same is presented below.

### 4.1.4 Interview Analysis of School Teachers

The analysis of interviews conducted with school principals and teachers is presented below;

1. The 75% of the school teachers agreed that student teachers were teaching as per the expectations of the school. The school teachers gave specific chapters to student teachers to teach; the student teacher discussed the content and pedagogical techniques with subject teachers and showed lesson plans to them. Whereas 25% of school teachers viewed that student teachers were lacking in skills like classroom management and student handling.
2. 57% of the school teachers told that student teachers were coming well prepared with lesson plans and teaching aids. They generally used mobiles and laptops to show pictures and videos. 43% of teachers agreed that some of them carried teaching aids and models. The school teachers argued that more emphasis should be on self-made resources. They were not of the view of 50% technological and 50% traditional resources. They wanted more use of traditional resources.
3. 100% of the teachers viewed that student teachers were creating challenging learning situations for learners in the classroom. They were asking for examples

from real life, inquiring for deep understanding and giving projects/assignments as homework.

4. 75% of teachers agreed that student teachers were involving learners in the exploration of new knowledge. 25% viewed that student teachers were encouraging learners to apply knowledge in new situations.
5. 100% of the teachers said that student teachers were passionate about teaching & learning process. They were regular in schools, always come prepared with lessons, perform various activities and even took part in parent teacher meetings. Some teachers mentioned the case study and action research projects of the student teachers.
6. 100% of school teachers agreed that student teachers were mostly using mobile and laptop in the classroom. They showed images, videos and expert comments on blogs and wikis. 22% of teachers said that student teachers planned interactions of learners with experts through mobile video calls and sometimes they called subject teachers from other schools to interact with the students.
7. 82% of the teachers viewed that the student teachers allowed learners to use internet to search new concepts, reads blogs of experts, to see live telecast and videos related to content.
8. Almost all teachers viewed that student teachers discussed real case studies and problems of society, ask for examples, and give assignments/projects from community. For examples learners worked on water pollution, visit Municipal Corporation, and planned rallies on women empowerment and de-addiction.
9. The student teachers were regular in the school & respect the time schedule. They inform principals or subject teacher in advance about their absence in school. They used lecture, discussion, activities, mobile use, videos and wikis in the teaching learning process.
10. All teachers were agreeing that student teachers were doing regular evaluations. They used different evaluation strategies like oral and written questions, worksheets, rubrics, online posts of students, presentations, project works, online

MCQs, and Online apps. Towards the end of lesson, they asked questions related to objectives. Sometimes they re-teach the content and many times asked other students to clear the concepts in class.

11. Student teachers gave regular homework. All teachers perceived homework as challenging and 14% of teachers said that sometimes homework was very heavy& beyond the level of learners.
12. 82% of the school teachers understand and appreciate the use of constructivist blended learning strategies. They perceived that blended learning strategies needs deep integration with traditional strategies and teacher should not stop using black board and books in the TLP. 18% of teachers considered blended learning constructivist strategies as time consuming and feared that a teacher might not be able to complete the prescribed syllabus in time. They believed that proper training in technology integration required for both teachers and students. More seriousness from everyone involved in the process is required. The technology integration should not distract the attention of students from learning in the class.

From above analysis, it can be summarized that student teachers were interacting with school teachers regularly, preparing lesson plans, meeting the expectations of the schools, encouraging learners to do activities, discussions, ask questions and relate learning to the real life. The 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 appreciate the use of technology but not at the expense of traditional activities and resources. So, they recommended proper training for technology integration for everyone involved in the process of instruction.

The quantitative and qualitative analysis shows that the CBIP based lesson plans were effective in improving the teaching effectiveness of student teachers. The learners from classes 6$^{th}$ to 10$^{th}$ were the central point of the whole research process as the student teachers delivered their CBIP based lesson plans to them in their classrooms. As learners are actual beneficiaries and potential stakeholders the efficacy of CBIP based lesson plans was also established on academic achievement of learners in schools. The details of the same are discussed below.

## 4.2 Effect of CBIP Treatment on Academic Achievement of Learners

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. 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 achievements. This data were analyzed in two ways.

1. Pretest-posttest design was used to study the effect of CBIP treatment on the academic achievement of learners
2. Posttest only research design was used to compare the post tests of both experimental and control group

### 4.2.1 Effect of CBIP Treatment on the Academic Achievement of Learners in Experimental Group

The CBIP based lesson plans were delivered by student teachers in all five school subjects viz. English, Hindi, Maths, Social Science and Science. The purpose was to increase the teaching effectiveness of student teachers but the experimentation process also effected the academic achievement of learners taught the student teachers through CBIP. So, here the CBIP treatment to learners mean that the learners were taught by student teachers with the CBIP based instructions. The unit tests were conducted before the treatment and after the treatment to the learners. The results of a paired-samples t' test in all the five subjects and with overall sample of experimental groups are given below in table 4.15.

**Table 4.15**

**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 4.15 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.

### 4.2.2 Difference in Mean Academic Achievement of Experimental and Control Group Learners

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 (refer to details of experimentation, page no. 145).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. The details are given below in table 4.16.

**Table 4.16**

**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

Table 4.14 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.

**Discussion**

The empirical evidences showed a significant effect of CBIP treatment on teaching effectiveness of student teachers and academic achievement of learners. Further analysis of the periodic observations revealed an incremental increase in teaching effectiveness of student teachers except from observation 1 to 2 in all subjects i.e. English, Hindi, mathematics, Social Science and Science. In the English subject, although there was increase in means from observation 3 to 4 and 4 to 5, but the differences were not found to be significant. The same trend was observed in mathematics and Social Science from observation 4 to 5. A significant effect was also observed on teaching effectiveness 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 Kelly (2008), Charif (2010) & Verma (2014) has found the significant effect of constructivist approaches on the academic achievement of students in chemistry; 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 6$^{th}$ grade science classes; and Yapic & Akbayin (2012) found positive effect of blended learning model on high school students' biology achievement. Quasmi (2014) found significant effect of technology integration 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 4.16) 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.

**Interpretation**

There is significant incremental effect of Constructivist Blended Instructional Paradigm on teaching effectiveness of student teachers in teacher preparation. In the beginning of the experimentation, the significant decrease in teaching effectiveness of student teachers was observed in all the subjects. The traditional mental setup and fixed behaviour of school teachers towards school practices was a major challenge to the experimentation. The maximum improvement was seen in lesson planning competence which was followed by knowledge construction and facilitation competence, technological competence, professional competence, and evaluation competence. The law of exercise, effect and reinforcement has played a very important role in the process.

The CBIP has also increased the academic achievement of all learners. The experimental groups have shown more improvement in academic achievement as compared to control group. But when it comes to individual subjects, significant effect of CBIP was found in Sciences, Maths and Social Science but significant effect was not found in English and Hindi subjects.

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.

The main aim of present research was to develop and evaluate constructivist blended instructional paradigm for teacher preparation. CBIP was developed and standardized through a pilot study. Its effectiveness was explored on the teaching effectiveness of student teachers; and hence, was found effective as it has improved the teaching effectiveness of student teachers. The mean rating analysis of indicators in TES scale and interview analysis of school teachers has empirically proved the effectiveness of CBIP. But, the actual beneficiaries of the CBIP were the learners in the schools to whom student teachers has delivered the lessons based on the CBIP paradigm. The learners are the potential stakeholders; therefore, their perception on the teaching skills or competencies of student teachers was very important. So, the effectiveness of the developed paradigm in teaching skills or competencies of student teachers through perception of school students was analysed quantitatively and qualitatively as discussed below.

## 4.3 Effectiveness of the developed Paradigm in Teaching Skills or Competencies of Student Teachers through Perception of School Students

One of the objectives of the study was framed to assess the effectiveness of the developed paradigm in teaching skills or competencies of student teachers through perception of school students. The hypothesis formulated was that there exists a significant effect of the developed paradigm on teaching skills or competencies of student teachers through perception of school students. The purpose was to see whether the CBIP treatment improve teaching effectiveness of student teachers or not, need to be seen through the perception of potential stakeholders i.e. learners. The quantitative and qualitative data were collected through perception scale and focussed group discussions respectively. The data, thus, collected were analysed through following three ways.

1. Significance of difference in mean scores of two perceptions of learners
2. Analysis of mean ratings

3. Analysis of focused group interviews conducted with learners

### 4.3.1 Significance of difference between Means of Two Perceptions of Learners

The data were collected from learners with the help of self-constructed Student Perception Scale towards Teaching. The scale consists of 39 statements in 5 dimensions i.e. Anticipatory Skill Competence, Knowledge Construction & Facilitation Competence, Technology Competence, Professional Competence, and Evaluation Competence. The scale was a parallel scale for Teaching Effectiveness Scale for student teachers. In the experimentation process, the perception scale was administered on 371 learners twice, first after the completion of 2$^{nd}$ observation (Perception score 1)and second after the completion of 4$^{th}$ observation (Perception score 2) of student teachers. The t'test was performed to find out the significant difference between means of the two perception scores. The results are given below in table 4.17.

**Table 4.17**

**Difference in Means of perception Scores**

| Subject | Group | N | Mean | SD | t' value | p-value |
|---|---|---|---|---|---|---|
| English | Perception scores (1) | 22 | 176.86 | 3.758 | 13.10* | 0.00 |
| | Perception scores (2) | 22 | 174.32 | 4.51 | | |
| Hindi | Perception scores (1) | 61 | 166.10 | 7.39 | 10.00* | 0.00 |
| | Perception scores (2) | 61 | 164.59 | 8.15 | | |
| Maths | Perception scores (1) | 79 | 157.59 | 12.85 | 8.57* | 0.00 |
| | Perception scores (2) | 79 | 155.52 | 13.86 | | |
| Social Sciences | Perception scores (1) | 109 | 160.17 | 13.83 | 5.89* | 0.00 |
| | Perception scores (2) | 109 | 158.31 | 14.64 | | |
| Sciences | Perception scores (1) | 100 | 163.49 | 15.28 | 11.93* | 0.00 |
| | Perception scores (2) | 100 | 161.47 | 16.05 | | |
| All subjects | Perception scores (1) | 371 | 160.55 | 14.32 | 16.23* | 0.00 |
| | Perception scores (2) | 371 | 162.48 | 13.57 | | |

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

From table 4.17, it is found that there is a significant difference between perception 1(M=160.55; SD=14.32) and perception 2 (M=162.48; SD=13.57), t' value (DF= 370) =16.23, p-value=0.00.So, the hypothesis, there exists a significant effect of the developed paradigm on teaching skills or competencies of student teachers through perception of school students was accepted.

Table 4.17 also shows that the corresponding p-values for all subjects are less than 0.05. It clearly indicates that there is a significant difference between the perception 1 and perception 2. Further, the mean analysis shows that the learners perceived that there is an increase in the teaching effectiveness of the student teachers. The quantitative results only recognized the increase in teaching effectiveness through learners' perception but to know where was the actual increment the mean analysis of ratings given by learners was done.

### 4.3.2 Analysis of Mean Rating (Statement Wise)

As discussed above, 371learners gave their perceptions through the perception scale on teaching effectiveness of student teachers. To further explore the perceptual areas of improvement, statement wise and dimension wise mean analysis was done. The qualitative analysis revealed that after 2$^{nd}$ observation, the learners perceived that student teachers were least effective in

- informing students about the objectives of the lesson,
- using technology to connect students with the experts,
- allowing students to work at their own pace,
- forming small groups for academic discussions,
- making evaluation criteria clear to every student,
- not making mistakes in board work,
- responding at once to the issues relating to behavior,
- using web resources to give real experience and
- giving rewards for best answers

The learners perceived that student teachers were most effective in

- helping the slow learners,
- showing concern with every student in the class,
- giving clear and precise instructions,
- using variety of resources to get responses from students,
- asking questions about the previous knowledge,
- showing positive behavior towards students,
- encouraging students to explore answers,
- coming to class fully prepared,
- writing important points on the black/white board and
- motivating students to perform activities

Further analysis of difference in mean rating of perception 1 (after 2nd observation) and perception 2 (after 4th observation) revealed that student teachers has shown improvement in informing students about the objectives of the lesson, using technology to connect students with the experts, and allowing students to work at their own pace. Other improved areas included giving clear and precise instructions, not yelling at students, praising the performer students, encouraging students to develop their own value system, correcting inappropriate behaviour and encouraging learner for self-evaluations. There were also some areas in which learners has not shown improvement like writing important points on the black/white board, encouraging students to explore answers, motivating students to perform activities and relating the content with daily life. To support these results, focussed group discussions were also conducted with learners. The analysis of the same is presented below.

### 4.3.3 Focused Group Discussions with Learners

Total 36 focus group discussions were conducted with learners. 17 focus group discussions were conducted after 2nd observation and 19 were conducted after 4thobservation of student teachers. The comparative analysis of interviews is presented below in table 4.18

**Table 4.18**

**Comparative Analysis of Focus Group Discussions**

| Point | Focussed Group Interview 1 (After $2^{nd}$ Observation) | Focussed Group Interview-1I (After $4^{th}$ Observation) |
|---|---|---|
| Learning Objectives/ Outcomes | In the beginning most of the student teachers informed about the topic of the day and did not tell about the expected outcomes. Some student teachers from sciences and Maths informed about the expected learning outcomes. | But towards end almost all student teachers informed learners about the expected outcomes in simple manner. Learners agreed that knowledge of outcomes motivate them for learning. |
| Previous Knowledge testing | The student teachers used oral questioning, images, flash cards, charts and some activities to test previous knowledge of students. | Student teachers used mobiles and laptops to ask questions, fewer activities planned. Learners opined that using technology was easy for them as it does not required flash cards and chart preparation. |
| Board work | Students perceived that student teachers used black board but not as good as their own subject teachers. | Very less use of board work. Mostly technology uses, showing ppts on laptops or projectors. Mostly, learners were not sure about the improvement in the board work. |
| Collaborations | Student teachers were more focussed on lecture and maintaining classroom discipline. Sometimes discussions were held in classes. | Student teachers were focused on group activities, discussions on videos, planning teaching aids, teaching other classmates (Peer tutoring). They involved students in these activities. |

| | | |
|---|---|---|
| Questions | Teacher asked more questions. 50% of the learners said that some teachers motivated them for asking questions. | Above average learners asked questions. Average or below average learners did not ask questions. |
| Feedback and Reinforcement | Clapping, Praise words like good, shabbassh, mostly used. Sometimes they give pencils to performer of the day. | Proper conformation of results, directions, clapping& patting, rewards and praise words continued throughout teaching practice. |
| Technology use in teaching and learning process | Mobiles for images and videos, laptops for ppts and showing images, animations (in sciences). Technology was mostly used by teachers. Some student teachers sent videos to learners to watch after school hours. | Some schools gave permissions to use mobiles in classroom. The interactions with experts were planned through mobile; laptops used for showing ppts and images, animations (in sciences), and online quizzes, reading blogs, wikis. More than 50% students agreed that student teachers were using technology in the classroom. Many student teachers came with 2-3 laptops in classes and learners use them in groups. More than 80 percent of students told that they learned new things with technology and their learning got extended to outside classroom. |
| Relation with daily life | People teachers asked lots of examples from daily life, Give home work related to life like causes of pollutions, awareness | Yes, they gave assignments and projects relating to problems of society. They gave questions relating to food habits, survey of diseases etc. |

| | | |
|---|---|---|
| | of government schemes, discussion with head of local gram panchayat etc. | Learners said that they developed understanding that every concept could be learned in society. |
| Classroom management | They managed classes with the help of school teachers, Mostly focussed on teaching. Many times they saw their copies during the teaching. | More managed as compared to beginning. They discussed content with students, find out the seasons and solve many problems by their own without the help of school teachers. |
| Evaluation strategies | Mostly oral questions, MCQs on board | Frequent small MCQ tests, Online MCQs, Written questions, Concept maps formation, assignments and projects in home work. They ask questions during the process and also ask in the end. Sometimes they used checklists and rubrics. |
| Remedial help | They directed the questions to other students and also explained answers by themselves. | Peer tutoring, Sometimes reteach the concept, planned extra classes for week students. |
| Overall teaching behavior of student teachers | Understanding, used teaching aids as compared to school teachers, used laptops. | They were excellent. Mobile, laptops used to show videos, and expert lectures. They were very polite in communication, listened to every student and also made students to laugh in certain cases. |

The learners perceived student teachers as excellent teachers. They perceived that student teachers 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. Student teachers were using technology effectively, but at the same time students perceived that their focus was more on integrating technology and they used board very rarely. Mostly, learners were not sure about the improvement in the board work. Many student teachers came with 2-3 laptops in classes and learners used them in groups. More than 80% of students perceived that they learned new things with technology and their learning got extended from classroom to outside world.

## 4.4 Technological Support Analysis

As discussed in table 4.2 (page no. 144) out of total 185 observations, 136 observations were personally done by the researcher & 49 observations were done through technological assistance i.e. taken through online, through video recording and captured through images. The technological, both online & offline, help was taken as it was not possible to manage lessons as per plan of action because of constraints like geographical distance between the schools and frequent changes in time table in most of the schools.

Out of 49 observations, 27 observations were done through online mode via mobile video call managed by another student teachers sitting at the back of the class. The observations through online media were very handy and suitable for researcher as they saved the time on travelling. It was also observed that student teachers were more confident, free and natural in their teaching when observed online as compared to face to face setting. So, the researcher has increased the frequency of online observations. 22 observations were captured through pictures and video recordings. The picture/photographs were captured by the peers of the student teacher teaching the class or were taken as screenshots from the video recordings of the student teachers. Hence, the collected photographs were classified in to following three types;

1. Photographs with no textual support
2. Photographs with limited textual support (Verbal or written)
3. Photographs with full textual support (Verbal)

From the collected photographs, further sorting was done with the help of two criteria; i.e. presence of student teacher in the photograph and theme based selection pertaining to the indicators given in the TES scale. As per the available literature, it was found that images performed particular roles with in the research. First, they aid in data collection; second, supportive role in data analysis without being subject to analysis (Harding et.al, 2009); and lastly, as data set & were analysed. In this research, technological support helped in data collection and secondly, images and videos performed supportive role in data analysis without being subject to analysis. Reflexive interpretation method and Semiotic method were employed to analyse the photographs. In reflexive interpretation method, the photographs with no or little textual support were discussed with the student teachers and the peer who captured the images. This method started a creative activity through a communicative process between student teachers and researcher which also aided in feedback and remedial session. In this process the textual support was provided to each image. In Semiotic method, a symbolic meaning or description was given to each image with the help of some specific signs (indicators of TES scale) in the image. The purpose was not review or analyse but to describe the image.

The qualitative data gathered through images and video recording was converted in to quantitative data to be used in quantitative analysis. So, the images and video recording were analysed by three experts and ratings were given on TES scale. The Kendall's Coefficient of Concordance for observation was calculated to see the agreement on ratings among three ratters/experts. The mean scores were computed from the ratings given to each item by three experts.

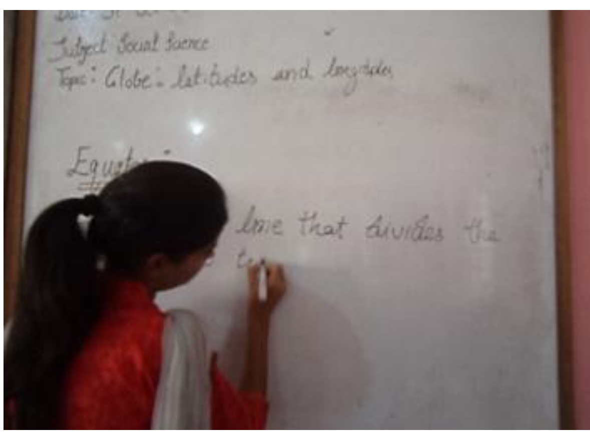
The value of W turned out to be 0.57. The corresponding value of chi-square was 340.82 which were found to be significant beyond 0.001 level of significance for 60 df.

It can be concluded with considerable confidence that agreement among the three experts while observing video lessons was higher enough than it would be by chance. The very low probability under null hypothesis associated with observed value of W enabled the investigator to reject the null hypothesis. There was good consensus among the three experts. Thus; the data collected by researcher were used in quantitative analysis and the qualitative interpretation given by researcher is objective and free from biases.

Secondly, the images and videos performed supportive role in data analysis without being subject to analysis. The complete images of teaching learning process of one student teacher are presented below. The more evidences of teaching of student teachers through CBIP are also given as appendix U.

The student teacher is showing video to engage learners and create interest in the topic

Student teacher exploring about the topic through technological assistance.

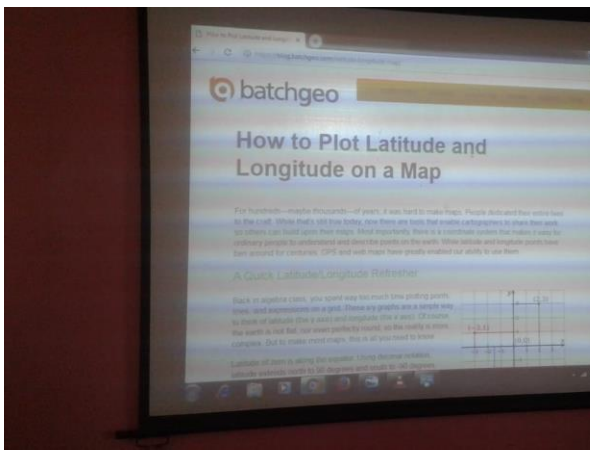



Student teacher has written topic on the board after announcement. She is writing important points on the board. Proper organization of board work is seen.

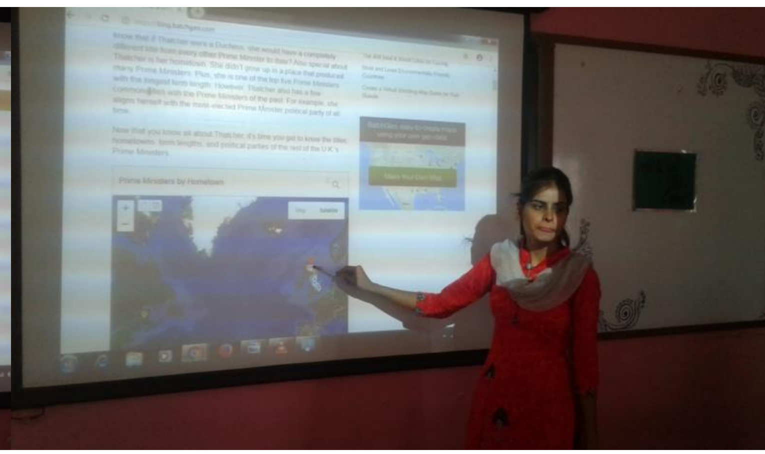
Student teacher is explaining the concpet of latitudes and longitudes with the help of Animated video. The learners are watching attentatively.


Student teacher is using wikipedia on longitude to update learners with the expert comments on the topic.

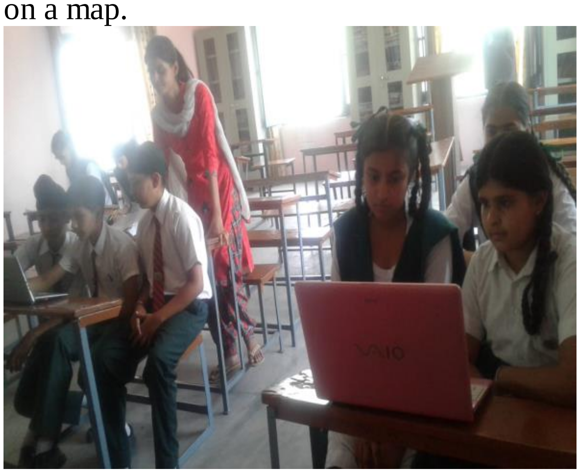
Student teachers using traditional face two face resources like white board and live discussions.

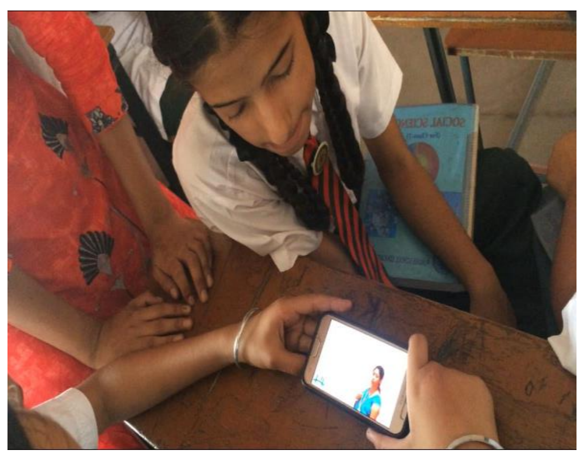



The student teacher is making learners to read blogs and construct their own understanding to plot latitude and longitude on a map.



The student teacher is analyzing the updated information given in blogs with the help of learners.





Student teacher using station rotation model of blended learning and providing conditions for increasing critical awareness.

Learners were using mobiles to see and reflect on expert videdos to extend their knowledge.

The student teacher is doing assessment through matching type questions. Learners are raising their hands

The learner answering to question on the board.

Student teacher is giving remedial sessions through re-teaching the content

Student teacher is giving homework to learners

## Overall Interpretation

The experimentation period was comprised of 50 working days corresponding to 300 hours spread over 18 schools. In total 712 hours & 15 minutes of treatment was given to learners through CBIP paradigm. 37 student teachers delivered 1221 lessons through CBIP in the classes and 175 lessons were observed by using TES scale. So, the student teachers were observed for 108 hours & 15 minutes through self or technology support. It corresponds to 18 days & 15 minutes (6 hours a day). In this way quantitative data were collected. In addition to this, the informal interviews of school teachers and focus group discussions with learners were also conducted regarding the performance of the student teachers. The quantitative, qualitative and technological support analysis; thus, led to the following interpretations.

- One of the objectives of the study was to find out the effect of constructivist blended instructional paradigm on teaching effectiveness of student teachers. The null hypothesis was formulated as there is no significant effect of constructivist blended instructional paradigm on teaching effectiveness of student teachers in teacher preparation. The quantitative analysis revealed that there is significant effect of constructivist blended instructional paradigm on teaching effectiveness of student teachers in teacher preparation. Hence, the null hypothesis was rejected. The interview analysis of school teachers also concluded that CBIP is effective in developing the teaching effectiveness among student teachers. It was found that student teachers were interacting with school teachers regularly, preparing lesson plans, and meeting the expectations of the schools, encouraging learners to do activities, discussions, ask questions and relate learning to the real life. The 100% of the school teachers were supporting constructivist blended learning strategies as these strategies resulted in the higher attainments in the learners. This summarization led to conclude that the student teachers has developed and increased their skills in lesson planning, pedagogical knowledge, technology uses, classroom management and evaluation. With the passage of time and effective practice with relevant feedback they have grown in to competent professionals. Further the mean analysis of ratings of 5$^{th}$ observation on TES scales indicated that students teachers has improved in the indicators like giving freedom to students to work at their own, developing objectives for all the three domains of development, designing objectives as per need of students & subject, establishing the climate of open mindedness & mutual trust, encouraging students to ask questions, distributing relevant reading material to students, encourages students to use their personal devices (cell phone, mp3 player, audio) in learning, creating situations that encourage students to assume responsibility, handling students' disruptive behavior appropriately, planning relevant educational activities as per level of students. So, hierarchically a descending order of teaching competence development was observed in lesson planning competence, knowledge construction & facilitation competence, technological competence, professional competence and evaluation competence. The technological analysis also depicted that student teachers were using videos to introduce the lesson, Wikipedia, animations, white board, Facebook, video lecture of experts to explain and elaborate the content and blogs, online tests, rubrics in evaluation. They involved students in hypothesis formulation and justification, explanations, elaborations and evaluations. They gave remedial sessions and appropriate home work to the students.

- Further analysis of the periodic observations revealed an incremental increase in teaching effectiveness of student teachers except from observation 1 to 2 in all subjects i.e. English, Hindi, mathematics, Social sciences and Sciences. It was found that, school subject teachers has given clear instructions to student teachers to maintain discipline, cover book content only, not giving freedom to learners, exposure to new technologies etc. After exploring causes of decrease in teaching competencies in 2$^{nd}$ observation & discussions with subject teachers it was found that they were governed by traditional norms. All these are due to their traditional mental set up like do switch off mobiles & authoritarian attitude of teachers for maintaining pin drop silence etc. in the classroom. Although, some of the schoolteachers verbally supported the experimentation the fixed behaviour of others towards various school practices was a challenge to the experimentation. Moreover, sudden changes cannot come overnight in the traditional set up-norms in the traditional classroom.
- The CBIP has also increased the academic achievement of all learners. The experimental groups have shown more improvement in academic achievement as compared to control group. But when it comes to individual subjects, significant

effect of CBIP was found in Science, Maths and Social Science but insignificant effect was found in English and Hindi subjects. The investigator had tried to understand these results from different perspectives.

As per empirical findings, the order of improvement in level of teaching effectiveness of student teachers is; Science > Hindi > English > Social Science > Mathematics. The student teachers teaching Hindi have shown maximum development in Technological Competence and those teaching English in KCFC. Moreover, the synthetic indexes shows that average of mean ratings of dimensions of teaching effectiveness in these subjects just near to overall average of mean ratings. Further, it was also found that the learners in experimental group have shown improvement in their academic achievement.

Therefore, it can be concluded that other organismic and environmental factors have played important roles in these results. Researchers (Furth, 1970, Dave, 1976, Nagpal, 1985) had found that speaking and listening activities are not included in our curriculum. There is a neglect of Languages and mostly focus is on other subjects. Whatever, little focus is there on Language teaching that is mainly on teaching of literature instead of language skills. The same holds true with this experimentation as with CBIP the focus was on development of epitomizing skills and HOTS. It was found that in control group, mastery through memorization of subject matter was promoted at the cost of development of language skills. In traditional set up, teaching learning process of language teaching and its assessment is still at knowledge level.

One of the objectives of the study was to assess the effectiveness of the developed paradigm in teaching skills or competencies of student teachers through perception of school students. The hypothesis formulated was that there exists a significant effect of the developed paradigm on teaching skills or competencies of student teachers through perception of school students. It was found that there exists a significant effect of the developed paradigm on teaching skills or competencies of student teachers through perception of school students. Hence, the hypothesis was accepted. To further explore the perceptual areas of improvement, statement wise and dimension wise mean analysis was done. The qualitative analysis revealed that after $2^{nd}$ observation, the learners perceived that student teachers were most effective in helping the slow learners, showing concern with every student in the class, giving clear and precise instructions, using variety of resources to get responses from students, asking questions about the previous knowledge, showing positive behavior towards students, encouraging students to explore answers, coming to class fully prepared, writing important points on the black/white board and motivating students to perform activities. The focus group discussions with learners revealed that the learners perceived student teachers as excellent teachers. They perceived that student teachers 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. Student teachers were using technology effectively, but at the same time students perceived that their focus was more on integrating technology and they used board very rarely. Mostly, learners were not sure about the improvement in the board work. Many student teachers came with 2-3 laptops in classes and learners used them in groups. More than 80% of students perceived that they learned new things with technology and their learning got extended from classroom to outside world.

# CHAPTER V

# SUMMARY AND CONCLUSIONS

**5.1 SUMMARY**
**5.2 CONCLUSIONS**
**5.3 LIMITATIONS**
**5.4 RECOMMENDATIONS**
**5.5 SUGGESTION**

# CHAPTER V
# SUMMARY AND CONCLUSIONS

The present chapter deals with the brief summary of the present research, conclusions, limitations, recommendations and suggestions for the further research.

## 5.1 SUMMARY

The present study developed Constructivist Blended Instructional Paradigm (CBIP) and explored its effectiveness on teaching effectiveness of student teachers in the Teacher Education Institutions (TEI) and academic achievement of learners in schools. The study also determined the efficacy of CBIP through the perception of learners and cooperative teachers regarding teaching competencies of student teachers. Hence, the teacher education and school education were considered as a continuum in which student teachers were trained in TEI to teach learners in schools through CBIP based lesson plans during internship programme.

The CBIP was the harmonious blend of all pedagogical approaches (behaviourism, cognitivist and constructivism), learning theories and technology in a balanced and pragmatic manner. The emphasis was to draw the best from all these approaches as per the Indian context & circumstances. In this instructional model, knowledge creation was situational, keeping in view the readily available resources (both offline and online) along with the prescribed text book content.

The paradigm was developed through three stages; Theoretical base & designing of paradigm, Development of lesson plans based on CBIP for the purpose of concretization, and Standardization of CBIP. The design of the model was sub divided in to six components (as per Basic teaching model by Glaser, 1962) i.e. focus, syntax, and social system, principle of reaction, support system and application. The planning and implementation phases of syntax were important. The focus of planning phase was on planning of instruction i.e. instructional designing or lesson planning. The outcome of the planning phase was well-developed lesson plans for all the five subjects. The prescribed syllabi, supplementary references and the updated, reliable internet content were used in lesson planning. It included components like goal setting, need analysis, content analysis, entry behaviour of learners, learning environment, expected outcomes as terminal objectives, decision about teaching - learning strategy & nature of blends, deciding learning resources and developing the strategies & blends, designing formative & summative assessment strategies. All these components worked in collaboration with each other, guiding & directing one another.

The planning phase was comprised of following activities:

1. Analyzing the subject matter prescribed in text book
2. Identifying the instructional goals & conducting need analysis
3. Analyzing the entering behavior of the learners
4. Formulation of instructional objectives
5. Sequencing organization of subject matter
6. Decision making about teaching - learning strategies
7. Deciding about the teaching-learning resources
8. Development of teaching - learning strategy & blends
9. Development of formative & summative assessment strategies

The implementation phase was the phase of actual practice. Both, the teacher and learners played an active role in various steps of implementation phase. The roles of teachers and learners were defined to lessen the gap between theory and practice or to bring reality close to aspirations put forth by CBIP. The lesson plans based on CBIP were delivered by student teachers in the implementation phase. This phase was sub-divided in to following steps;

1. Learning organization
2. Presentation of the puzzling problem or events
3. Formulation of hypotheses
4. Verification of hypothesis
5. Formulation of explanations
6. Increasing critical awareness
7. Assessment of understanding & reflections

The important features of the CBIP were

1. The social nature of model was taken from socio-cultural theory and situated learning theory. Role of previous knowledge, assimilation and accommodation from Piagetian constructivism. Holistic approach to instructional design from Blooms models (including revised and digital Blooms taxonomy). Technological social environment or technology integration from TPACK and blended learning models. The importance of culture, language and Zone of Proximal development (ZPD) and scaffolding continuum from socio-cultural theory. The role of instructor from both Cognitive Apprenticeship Model and Merrill principles. Systematic planning from Gagne's nine events and Dick and Caray Model. The assessment features from individualized instructional model, the instructions in small steps from Programme learning and Successive Approximation Model (SAM). So, the paradigm was Constructivist and Blended.
2. It emphasized the selection and development of appropriate blends of traditional face-to-face and online resources as per the context and content.
3. It defined the role of both teacher and learner in the execution of blends during teaching learning process.
4. It consisted of learning organization in the beginning and assessment and reflections at the end. Thus, gave importance to organization of resources and feedback in the end.
5. The paradigm through its design and implementation phase instructional designing competence, knowledge construction and facilitation competence, professional competence, technological competence and evaluation competence.

In nut shell, the development of this paradigm was a balanced & harmonious blend of different pedagogical approaches, learning theories and technologies. It was blending of traditionalism and modernism, a harmonious practical combination of East & West. In this sense this paradigm could be rightly called as Constructivist Blended Instructional Paradigm (CBIP).

This paradigm was developed to solve the problems of Indian Education System. It improved the pedagogical richness in prospective teachers, ensured equality in educational opportunities for all learners, improved the academic performance of learners, provided universal access and equality in educational opportunities, and reduced the cost of education thereby, found solution to the problem of high investments and low returns. In this sense this model was of immense importance for educational institutions and school education and has greatly influenced the training and instructional procedures.

The statement of the study was '**Effectiveness of Constructivist Blended Instructional Paradigm'.**

**The objectives of the study were**

1. To develop a Constructivist Blended Instructional Paradigm.
2. To explore the effect of constructivist blended instructional paradigm on teaching effectiveness of student teachers in teacher preparation.
3. To assess the effectiveness of the developed paradigm in teaching skills or competencies of student teachers through perception of school students.

**Hypotheses were formulated as**

1. There exists no effect of constructivist blended instructional paradigm on teaching effectiveness of student teachers in teacher preparation.
2. There exists a significant effect of the developed paradigm in teaching skills or competencies of student teachers through perception of school students.

The study was delimited to English, Hindi, Mathematics, Science & Social Science subjects and to one Teacher Education Institute and 18 secondary schools of Doaba region of Punjab, India. Further the study was delimited to blended strategies at activity level only and the effect of CBIP was seen on academic achievement of students with respect to five subjects only. The type of school, class and examination board were not taken into consideration.

## Methodology

The study used mixed method research approach as it involved collection & analysis of quantitative and qualitative data. The quantitative data were collected through rating scales and experimentation; qualitative data was collected through focus group discussions & interviews; and in technological assistance data were captured through pictures and videos. In a nut shell, it was a fixed mixed method research using rating scales, experimentation, interviews, focus group discussions, picture and video recording. The research intended to illustrate quantitative outcomes with qualitative findings and synthesize a complete understanding about the effectiveness of CBIP. So, the convergent parallel research design (also called as concurrent triangulation) was used.

The sample for CBIP standardization comprised of 5 student teachers (one each from Science, English, Hindi, Social Sciences & Mathematics) and 166 school students from $6^{th}$, $7^{th}$& $9^{th}$ grades through convenience sampling. Sample of scale standardization consisted of 875 student teachers from three different institutions of education from sessions 2016-17 & 2017-18 to standardize TES scale and 242 learners from 5 schools to standardize the perception scale towards teaching effectiveness for learners. For actual experimentation, the population of the study comprised of 37 student teachers and 796 school students of $6^{th}$ to $10^{th}$ grades studying in 18 secondary schools of Doaba region of Punjab (India). Another sample at school level included 25 school teachers or principals who acted as mentors to student teachers and observed them informally in the classes.

The following tools were developed, standardized and used for data collection.

1. Constructivist Blended Instructional Paradigm
2. Lesson plans based on Constructivist Blended Instructional Paradigm
3. Teaching Effectiveness Scale (TES) for student teachers
4. Student Perception Scale towards teaching
5. Interview schedule for school principal/Subject teacher
6. Interview schedule for learners

The study was conducted through following steps;

- Development and standardization of CBIP

- Development of model lesson plans based on CBIP for five school subjects i.e. Sciences, Mathematics, English, Social sciences and Hindi.
- Training of student teachers in lesson plan development and lesson delivery as per CBIP in simulated teaching.
- Development and standardization of Teaching Effectiveness Scale for student teachers and Student Perception Scale towards Teaching for learners.
- Every seventh lesson of the student teachers was observed through TES or captured through mobile. Total Five observations of student teachers were conducted. One in simulation and other four in real classrooms with learners from grades $6^{th}$ to $10^{th}$.
- The experimentation stage consisted of 50 working days corresponding to 300 hours spread over 18 schools. In total 712 hours & 15 minutes of treatment were given to learners through paradigm. In total 1221 lessons through CBIP were delivered in the classes and 175 lessons were observed by using TES scale. So, the student teachers were observed for 107 hours & 55 minutes through self or technology support. It corresponds to 18 days (6 hours a day). Personal feedback sessions were organized for student teachers.
- The school students were oriented towards desired competencies in student teachers. They filled perception scale after $2^{nd}$ and $4^{th}$ observation of student teachers.
- Total 36 focused group interviews were conducted with learners. 17 interviews were conducted after $2^{nd}$ observation and 19 interviews were conducted after $4^{th}$ observation of student teachers.
- Informal interviews were conducted with five school principals and 20 school teachers.

The study involved analysis of quantitative & qualitative data. The paired samples t' tests, independent sample t' tests were used as quantitative data analysis techniques; mean rating analysis, interview analysis, focus group discussion, reflective analysis and semiotic analysis were used as qualitative data analysis techniques; and The Kendall's

Coefficient of Concordance was used to analyse the data collected through technological support.

## 5.2 CONCLUSIONS

In the light of discussions and interpretations discussed in preceding chapter (chapter 4), the following conclusions are drawn;

1. The practice of teaching through the Constructivist Blended Instructional Paradigm has increased the level of teaching effectiveness of student teachers in teacher preparation. At the beginning (after 1st observation) 49% of student teachers were having a low level of teaching effectiveness. But after the 5th observation, 49% of student teachers were having a high level and 16% were having above average, 16% in average, and 16% in moderate levels of teaching effectiveness. Only 3% (one student) were having a low level of teaching effectiveness. The school teachers also perceived that the student teachers have developed and increased their skills in lesson planning, pedagogical knowledge, technology uses, classroom management, and evaluation. With the passage of time and effective practice with relevant feedback, they have grown into competent professionals.
2. The student teachers developed maximum competence in Lesson Planning and least in Evaluation. The descending order of competence development of teaching effectiveness was; LPC > KCFC > TC > PC > EC. It was found that student teachers have developed the least skills of giving clear direction, informing students about expected outcomes, use of e-mail, wikis, Facebook in the learning process, board work, formative assessment techniques, using rubrics & online quizzes, blogs in evaluation, and giving creative assignments. So, Evaluation Competence was least developed in student teachers.
3. The empirical evidences revealed a decrease in the teaching effectiveness of student teachers from observation 1 to 2. The synthetic indexes showed that in observation 2 there was a slight increase in Lesson Planning and Technological

Competencies of student teachers and a decrease in mean ratings were observed in Knowledge Construction & Facilitation, and Evaluation Competencies The overall mean score of TES dimensions have also decreased from observation 1 (mean=4.02) to observation 2 (M=3.94). After analysis, it was found that, in observation 2, student teachers performed poorly in KCFC indicators like topic exploration, use of resources, content mastery, facilitator role, teaching style, using a constructivist approach, holistic instruction, higher-order skills, engagement, exploration, explanation, board work, elaboration skills, questioning, teaching strategies, stimulus variation; and in evaluation competence indicators like closure, recapitulation, CCE practices, technology use, online evaluations, using a variety of assessment techniques, homework, and assignments.

4. The comparative analysis of mean scores of TES dimensions between observation 1 and 5 shows that the student teachers improved in TES dimensions in descending order as follow; LPC (1.52) > PC (1.38) > KCFC (1.23) > TC (1.15) > EC (1.03). Again, the maximum improvement was seen in Lesson Planning Competence and least in Evaluation Competence.
5. The student teachers teaching Science have developed maximum teaching effectiveness and those teaching Maths have developed least. The descending order of teaching effectiveness is as follow; Science (5.70) > Hindi (5.34) > English (5.26) > Social Science (5.1) >Maths (4.97)
6. The student teachers teaching Hindi and Social science showed maximum development in Technological Competencies.
7. The student teachers teaching English and Maths showed maximum development in Knowledge Construction & Facilitation Competencies.
8. The student teachers teaching Science showed maximum development in Lesson Planning Competencies.
9. There is 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. But when it comes to individual subjects, a significant effect of CBIP was found in Science, Maths, and Social Science but a significant effect was not found in English and Hindi subjects.

10. 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.
11. In the beginning, the learners perceived that student teachers were least effective in informing students about the objectives of the lesson, using technology to connect students with the experts, allowing students to work at their own pace, forming small groups for academic discussions, making evaluation criteria clear to every student, not making mistakes in board work, responding at once to the issues relating to behavior, using web resources to give real experiences and giving rewards for best answers.
12. Towards the end of experimentation, the learners perceived that student teachers were effective in helping the slow learners, showing concern with every student in the class, giving clear and precise instructions, using a variety of resources to get responses from students, asking questions about the previous knowledge, showing positive behavior towards students, encouraging students to explore answers and coming to class fully prepared,
13. The learners perceived student teachers as excellent teachers. It was found that student teachers have shown improvement in their weak areas like informing students about the objectives of the lesson, using technology to connect students with the experts, and allowing students to work at their own pace. Other improved areas included giving clear and precise instructions, not yelling at students, praising the performer students, encouraging students to develop their value system, correcting inappropriate behavior, and encouraging learners for self-evaluations.

14. Learners perceived that student teachers have not shown improvement in writing important points on the black/whiteboard, encouraging students to explore answers, and motivating students to perform activities with time and practice.
15. More than 80% of students perceived that they learned new things with technology integration in the teaching-learning process and their learning got extended from the classroom to the outside world.

## 5.3 LIMITATIONS

In the present research problem the researcher encountered the following limitations:

1. The traditional mental setup and fixed behavior of school teachers towards traditional school practices were the major challenges to the experimentation.
2. In September 2017, the experiment was started with student teachers of one of the teacher education institutions but could not work. The selected student teachers were not regular and serious about the lesson delivery in classroom.
3. The experiment was simultaneously running in 18 schools. So, the observation of every lesson of each prospective teacher was a serious challenge.
4. In some schools, the use of technology was not allowed. The special restricted permission was given for student teachers to use technology in classrooms.
5. Some students from lower classes ($6^{th}$ & $7^{th}$) do not have mobile phones. So sending text or video content (flipped technology) to them was not working in the beginning. But later in the process, the mobiles of their parents/other family members were used. Slow internet problems were also seen in some cases.

## 5.4 RECOMMENDATIONS

The most outstanding characteristic of any research is its contribution to the development of the concerned field. The findings of the study help the researcher to suggest the following recommendations:

1. The Constructivist Blended Instructional Paradigm showed incremental effects on the teaching effectiveness of student teachers. The study recommends that the

Teacher Education Institution in India should use CBIP to develop teaching effectiveness among student teachers in teacher preparation.

2. The Constructivist Blended Instructional Paradigm has increased the academic achievement of learners in school. Therefore, it should be used to develop or enhance the teaching effectiveness among in-service teachers also.
3. Blended learning has vast potential in providing solutions to the problems of Indian Education. The problems of accessibility, low pedagogical richness, high investment & low returns, problems of equity, equality, distance learners, inclusive education, issues in assessment & evaluations are few to mention. The study recommends Teacher Education Institutions should conduct orientation programmes to prepare student teachers proficient in using blended learning approaches so that problems of Indian education be resolved to some extent.
4. The study found a lack of both traditional and technological resources in schools. The researcher along with student teachers created just equitable resources in experimenting schools. The various funds, efforts at the local and national level need to be directed towards schools for providing basic resources and preparing them to welcome blended learning approaches. This will result in preparing independent learners, thinkers for the future.
5. In the blended learning procedure, every stakeholder has its role. The blends require a harmonious combination of face two face & online systems but its implementation requires harmonious collaborations from different stakeholders. Even one in-effective collaboration can ruin the essence of blending. The study recommends proper training for technology integration for everyone involved in the process of instruction, especially teachers, students, and parents.
6. Technology should be viewed as a resource/tool like other resources which aid in teaching. The pedagogy, content, and context should decide the type of technology to be used in the teaching-learning process. Technology should not decide the pedagogy. The study recommends that overemphasize on technology

sometimes ruins the effective traditional collaborative environment of the classroom.

7. The lesson planning procedures in schools need improvement concerning their planning and execution. School teachers should be oriented to develop elaborated lesson plans with respect to content, objectives, pedagogy, resources, and assessment.

## 5.5 SUGGESTIONS

Research is a continuous and on-going process and there is always space for further studies. The present research put forward the following suggestions for future studies:

1. This research explored the effects of the constructivist blended instructional paradigm on the teaching effectiveness of student teachers in teacher preparation and assessed the effectiveness of the developed paradigm on the teaching skills or competencies of student teachers through the perception of school students. As such, it does not present any single solution to the problems of the Indian education system. So, further studies need to be conducted on the impact of the constructivist blended instructional paradigm on pedagogies, accessibilities and finding solutions to technological incompetence, large classes, actual lesson delivery in Indian classrooms, etc.
2. Further research can be conducted on developing constructivist blended learning models at the course level, program level, and institution level.
3. As this study was conducted with student teachers of one teacher education institution, it should be considered as action research. The empirical results should be used to carry out similar researches involving more than one TEI or at the national level.
4. The effect of the constructivist blended instructional paradigm can be seen on the academic achievement of students with respect to the types of schools, grades, and type of examination board.

5. The research suggests carrying out more researches on the effects of Constructivist Blended Instructional Paradigm researches in language teaching and exploring its effects on the academic attainment of learners.
6. Follow-up studies need to be conducted on student teachers after getting employed in schools.
7. A similar study can be conducted on in-service teachers to increase their teaching effectiveness.

# BIBLIOGRAPHY

# Bibliography


1. Abbitt, J. T. (2011). Measuring technological pedagogical content knowledge in pre-service teacher education: A review of current methods and instruments. *Journal of Research on Technology in Education*, *43*(4), 281-300.
2. Ackermann, E. (2001). Piaget's constructivism, Papert's constructionism: What's the difference? *Future of Learning Group Publication*, *5*(3), 438.
3. Alanazi, A. (2016). A critical review of constructivist theory and the emergence of constructionism. *American Research Journal of Humanities and Social Sciences (2)*, 1-8. and psychological measurement, 12, 313-315.
4. Anderson, T. & Kanuka, H. (1999). Using constructivism in technology-mediated learning: Constructing order out of the chaos in the literature.
5. Andrew, M. D., Cobb, C. D., & Giampietro, P. J. (2005). Verbal ability and teacher effectiveness. *Journal of Teacher Education*, 56, 343-354.
6. Andrews, D. H., & Goodson, L. A. (1980). A comparative analysis of models of instructional design. *Journal of instructional development*, *3*(4), 2-16.
7. Angeli, C. & Valanides, N. (2009). Epistemological and methodological issues for the conceptualization, development, and assessment of ICT–TPCK: Advances in technological pedagogical content knowledge (TPCK). *Computers & Education*, *52*(1), 154-168.
8. Anthony G. Picciano, Charles D. Dziuban and Charles R. Graham (eds). Routledge, New York and London, 2013, 354 pp. ISBN 978-0-415-63250-8(hbk), ISBN 978-0-415-63251-5 (pbk), ISBN 978-1-315-88031-0
9. Appling, S. E., Naumann, P. L., & Berk, R. A. (2001). Using a faculty evaluation triad to achieve evidence-based teaching. *Nursing and Health Care Perspectives*, 22, 247–251.
10. Arreola, R. A. (2000). Developing a comprehensive faculty evaluation system: A handbook for college faculty and administrators on designing and operating a comprehensive faculty evaluation system (2nd ed.). Bolton, MA: Anker.
11. Ausburn, L.J. (2004). Course design elements most valued by adult learners in blended online education environments: An American perspective. *Educational Media International, 41*(4), 327-337.

12. Bala, J. (2012). A comparative study of quality factors in Elementary Teacher Education Programmes. *(Unpublished Ph.D. thesis). Jamia Millia Islamia*, New Delhi, India.
13. Barr, R. (2001). Research on the teaching of reading. *Handbook of Research on Teaching*, *4*, 390-415.
14. Berk, R. A. (2005). Survey of 12 strategies to measure teaching effectiveness. *International Journal of Teaching and Learning in Higher Education*, *17*(1), 48-62.
15. Bersin & Associates. (2003). Blended learning: What works? Oakland, CA: Bersin by Deloitte. Retrieved November 3, 2014, from https://education-2020.wikispaces.com/file/view/blended_bersin.doc
16. Bhatia, H.,K. & Haider, A. (2015). Pre-service teacher's perception towards use of Whatsapp (Mobile Learning Application) in school experience programme. *International Education Conference 2015: Learning Technologies in Education, 354-366.* Excel India Publishers, New Delhi.
17. Bloom, B. S. (1956). Engelhart, MD, Furst, EJ, Hill, WH, &Krathwohl, DR. *Taxonomy of educational objectives: the classification of educational goals. Handbook*, *1*.
18. Bloom, B. S. (1956). Taxonomy of educational objectives. Vol. 1: Cognitive domain. *New York: McKay*, 20-24.
19. Bloom, B. S., Englehart, M. D., Furst, E. J., Hill, W. H., & Krathwohl, D. R. (1956). *The Taxonomy of educational objectives, handbook I: The Cognitive domain*. New York: David McKay
20. Bonk, C. & Graham, C. (2005). Handbook of blended learning: Global perspectives, local designs. San Francisco, CA: Pfeiffer Publishing.
21. Bransford, J. D., Brown, A. L. & Cocking, R. R. (2000). *How people learn* (Vol. 11). Washington, DC: National Academy Press.
22. Braskamp, L. A., & Ory, J. C. (1994). Assessing faculty work. San Francisco: Jossey-Bass.
23. Brooks, J. G. & Brooks, M. G. (1999). In search of understanding: The case for constructivist classrooms. ASCD.

24. Brown, A. L. & Campione, J. C. (1994). *Guided discovery in a community of learners*. The MIT Press.
25. Brown, J. S., Collins, A. & Duguid, P. (1989). Situated cognition and the culture of learning. *Educational Researcher*, *18*(1), 32-42.
26. Brown, J.S., Collins, A. & Duguid, S. (1989). Situated cognition and the culture of learning. *Educational Researcher, 18* (1), 32-42.
27. Brown, T. A. (2015) *Confirmatory factor analysis for applied research*. (2nd Rev. Eds.) New York: Guilford Press.
28. Brown, T. A., & Moore, M. T. (2012). Confirmatory factor analysis. In R. H. Hoyle (Eds.), *Handbook of structural equation modeling*. (pp. 361-379). New York: Guilford Press.
29. Bruner, J. *Actual Minds, Possible Worlds*. Cambridge, MA: Harvard University Press, 1986.
30. Bruner, J. *Child's Talk: Learning to Use Language*. New York: Norton, 1983.
31. Bryan, A. & Volchenkova, K. N. (2016). Blended learning: Definition, models, implications for higher education. *Bulletin of the South Ural State University. Ser. Education*, *8*(2), 24-30.
32. Cambre, M. A. (1981). Historical overview of formative evaluation of instructional media products. *ECTJ*, *29*(1), 3-25.
33. Chennat, S. (2014). Internship in pre-service teacher education programme: A global perspective. *International Journal of Research in Applied, Natural and Social Sciences*, *2*(11), 79-94.
34. Chew, E., Jones, N. & Turner, D. (2008). Critical review of the blended learning models based on Maslow's and Vygotsky's educational theory. *An International Conference on Hybrid Learning and Education* (pp. 40-53). Springer, Berlin, Heidelberg.
35. Cobb, P., Wood, T., Yackel, E., Nicholls, J., Wheatley, G., Trigatti, B. & Perlwitz, M. (1991). Assessment of a problem-centered second-grade mathematics project. *Journal for research in mathematics education*, 3-29.
36. Cochran, K. F., DeRuiter, J. A. & King, R. A. (1993). Pedagogical content knowing: An integrative model for teacher preparation. *Journal of teacher Education*, *44*(4), 263-272.

37. Commonwealth of Learning. (2009). Using mobile technology for learner support in open schooling a report to the Commonwealth of Learning. Retrieved from: http://oasis.col.org/bitstream/handle/11599/255/Mobile_Technologies_FinalReport.pdf?sequence=1&isAllowed=y
38. Creswell, J.W. (2009) *Research design: qualitative, quantitative, and mixed methods approaches,* 3rd edn, SAGE, Los Angeles; London.
39. Creswell, J.W. (2011) *Designing and conducting mixed methods research,* 2nd edn, SAGE, Los Angeles; London.
40. Culp, K. M., Honey, M., & Mandinach, E. (2003). A retrospective on twenty years of education technology policy. Office of Educational Technology. Retrieved September 9, 2010.
41. Cummings, J. N. (2004). Work groups, structural diversity, and knowledge sharing in a global organization. *Management science, 50*(3), 352-364.
42. Darling-Hammond, L. (2000). Teacher quality and student achievement: A review of state policy evidence. *Education Policy Analysis Archives*, 8(1). Retrieved from http://epaa.asu.edu/epaa/v8n1
43. Das, R. (2012). Integrating ICT in teaching learning framework in India: Initiatives and Challenges. *Bhatter College Journal on Multidisciplinary Studies*. 2, 21-27
44. Dave, R. H. (1998). Towards effective teacher education. Competency Based and Commitment Oriented Teacher Education for Quality School Education. *NCTE document, 98/36,* 5-52.
45. Dave`, P.N. (1976). Hierarchy in Cognitivr Learning, RCE, Mysore
46. Desai, M. S., Hart, J. & Richards, T. C. (2008). E-Learning: Paradigm Shift in Education. *Education*, *129*(2), 327-334.
47. DeVellis, R. F. (2017). Scale development: theory and applications (4th ed.). ThousandOaks, CA: Sage.
48. Dewey, J. *Experience and Education* New York: Macmillan, 1938.
49. Dick W., & Reiser, R.A. (1989). Planning effective instruction. Englewood Cliffs, NJ: Prentice-Hall

50. Dick, W. (1987). A history of instructional design and its impact on educational psychology. In *Historical foundations of educational psychology* (pp. 183-202). Springer, Boston, MA.
51. Dick, W. (1987). A history of instructional design and its impact on educational psychology. In J. Glover & R. Roning (Eds.), Historical foundations of educational psychology. New York: Plenum
52. Dick, W., & Carey, L. (1978). The systematic design of instruction (1st ed.). Glenview, IL: Scott, Foresman.
53. Dick, W., Carey, L, & Carey, J.O. (1937). *The Systematic Design of Instruction* (6th ed). Boston, MA: Allyn and Bacon.
54. Driscoll, M. (2002, March 1). Blended learning: Let's get beyond the hype. *e-learning*. http://www.ltimagazine.com/ltimagazine/article/articleDetail.jsp?id=11755.Graham, C. R., & Allen, S. (2005). Blended learning: An emerging trend in education. In C. Howard, J. V. Boettecher, L. Justice, K. D. Schenk, P. L. Rogers, & G. A. Berg (Eds.), *Encyclopedia of distance learning* (pp. 172–179). Hershey, PA: Idea Group.
55. Driscoll, M.P. (2000). Psychology of learning for instruc- tion (2nd ed). Needham Heights, MA: Allyn & Bacon.
56. Duffy, T. M. (81). Jonassen, D. H. (1992). Constructivism: New implications for instructional technology. *Constructivism and the technology of instruction: A conversation*, 1-16.
57. Dziuban, C.D., Hartman, J., Juge, F., Moskal, P.D., & Sorg, S. (2005). Blended learning: Online learning enters the mainstream. In C.J. Bonk & C. Graham (Eds.), *Handbook of Blended Learning Environment*. Pfeiffer Publications**.**
58. Dziuban, J. I. & Dziuban, C. D. (1998). Reactive Behavior Patterns in the Classroom. *Journal of Staff, Program & Organization Development, 15*(2), 85-91.
59. Fazal, M., & Bryant, M. (2019). Blended learning in middle school math: The question of effectiveness. *Journal of Online Learning Research, 5*(1), 49–64.

60. Fazal, M., Panzano, B., & Luk, K. (2019). Evaluating the Impact of Blended Learning: a Mixed-Methods Study with Difference-in-Difference Analysis. *Tech Trends*

61. Fornell, C., and Larcker, D. F. (1981). Evaluating Structural Equation Models with Unobservable Variables and Measurement Error. *Journal of Marketing Research, 18*(1), 39-50. Retrieved from http://www.sciepub.com/reference/131741

62. Freedman, S. W. (1994). *Exchanging writing, exchanging cultures: Lessons in school reform from the United States and Great Britain*. Harvard University Press.

63. Friesen, N. (2012). Report: Defining blended learning. *Learning Space*.

64. Furr, R. M. (2011). Scale construction and psychometrics for social and personality psychology. New Delhi, IN: Sage Publications. https://doi.org/10.4135/9781446287866

65. Furr, R. M., & Bacharach, V. R. (2013). *Psychometrics: an introduction*. Second Edition. Sage.

66. Gagné, R. M. (1985). The conditions of learning and theory of instruction (Vol. 4). *Tokyo, Japan: Holt-Saunders*.

67. Gagne, R.M., & Briggs, L.J. (1974). Principles of instruc- tional design (1st ed.). New York: Holt, Rinehart, and Winston.

68. Garrison, D.R & Kanuta, H. (2004). Blended learning: Uncovering its transformative potential in higher education. *The Internet and Higher Education. 7(2)*, 95-105.

69. Gerlach, V.S., & Ely, D.P. (1980). Teaching and media: A systematic approach (2nd ed.). Englewood Cliffs, NJ: Prentice-Hall.

70. Gibson, C. B. & Gibbs, J. L. (2006). Unpacking the concept of virtuality: The effects of geographic dispersion, electronic dependence, dynamic structure, and national diversity on team innovation. *Administrative Science Quarterly, 51*(3), 451-495.

71. Gill, L., & Dalgarno, B. (2008). Influences on pre-service teachers' preparedness to use ICTs in the classroom. *Hello! Where are you in the landscape of educational technology*?

72. Glaser, R. (1963). Instructional technology and the measurement of learing outcomes: Some questions. *American psychologist*, *18*(8), 519.
73. Glaser, R. (1963). Instructional technology and the measurement of learning outcomes: Some questions. American Psychologist, 18, 519-521
74. Glaser, R. (Ed.). (1965). *Training research and education*. Science Editions, John Wiley & Sons, Inc.
75. Graham, C. R. (2005). Blended learning systems: Definition, current trends, and future directions. In C. J. Bonk & C. R. Graham (Eds.). *Handbook of blended learning: Global perspectives, local designs.* San Francisco, CA: Pfeiffer Publishing.
76. Graham, C. R. (2006). Blended learning systems. *The Handbook of Blended Learning*, 3-21.
77. Graham, C. R., Allen, S. & Ure, D. (2003). Blended learning environments: A review of the research literature. *Unpublished Manuscript, Provo, UT*, 3-5.
78. Groff, J., & Mouza, C. (2008). A framework for addressing challenges to classroom technology use. *AACe Journal*, *16*(1), 21-46.
79. Gupta, S. (2011). Constructivism as a paradigm for teaching and learning. *International Journal of Physical and Social Sciences*, *1*(1), 23-47.
80. Gustafson, K.L. (1993). Instructional design funda- mentals: Clouds on the horizon. Educational Technol- ogy, 33(2), 27-32.
81. Harris, J., Mishra, P. & Koehler, M. (2009). Teachers’ technological pedagogical content knowledge and learning activity types: Curriculum-based technology integration reframed. *Journal of Research on Technology in Education*, *41*(4), 393-416.
82. Heinich, R. (1970). Technology and the management of instruction (Association for Educational Communications and Technology Monograph No. (4). *Washington, DC: Association for Educational Communications and Technology*.
83. Hernandez-Ramos, P. (2005). If not here, where? Understanding teachers’ use of technology in Silicon Valley schools. *Journal of Research on Technology in Education*, *38*(1), 39-64.

84. Hew, K. F. & Cheung, W. S. (2014). *Using blended learning: Evidence-based practices*. Singapore: Springer.

85. Hmelo-Silver, C. E. & Barrows, H. S. (2006). Goals and strategies of a problem-based learning facilitator. *Interdisciplinary Journal of Problem-Based Learning*, *1*(1), 4.

86. Hmelo-Silver, C. E., Duncan, R. G. & Chinn, C. A. (2007). Scaffolding and achievement in problem-based and inquiry learning: a response to Kirschner, Sweller, and. *Educational Psychologist*, *42*(2), 99-107.

87. House, R. (2002, January 8). Clocking in column. *Spokesman-Review.* Hughes (Eds.), The Wiley handbook of psychometric testing: A multidisciplinary

88. Ilie, M. (2014). An adaption of Gagné's instructional model to increase the teaching effectiveness in the classroom: the impact in Romanian Universities. *Education Tech Research, 62*:767–794

89. Irwing, P., & Hughes, D. J. (2018). Test development. In P. Irwing, T. Booth, & D. J.

90. Jang, S. J., & Chen, K. C. (2010). From PCK to TPACK: Developing a transformative model for pre service science teachers. *Journal of Science Education and Technology, 19*(6), 553–564.

91. Jimoyiannis, A. et. al (2016). Pedagogical and instructional design issues towards the integration of Web 2.0 tools in instruction.

92. Jonassen, D. H. & Rohrer-Murphy, L. (1999). Activity theory as a framework for designing constructivist learning environments. *Educational Technology Research and Development*, *47*(1), 61-79.

93. Jonassen, D. H. (1997). Instructional design models for well-structured and III-structured problem-solving learning outcomes. *Educational Technology Research and Development*, *45*(1), 65-94.

94. Kanuka, H. (2006). Instructional design and eLearning: A discussion of pedagogical content knowledge as a missing construct. *E-Journal of Instructional Science and Technology, 9*(2).

95. Kemp, J.E. (1971). Instructional Design: A Plan for Unit and Course Development. Belmont, CA: Fearon.

96. Khan, B. H. (1998). Web-based instruction: an introduction. *Educational Media International*, *35*(2), 63-71.
97. Kimonen, E., & Nevalainen, R. (2013). *Transforming Teachers' work Globally: In Search of a Better Way For Schools and Their Communitites*. Sense Publishers.
98. Kirschner, P. A., Sweller, J. & Clark, R. E. (2006). Why minimal guidance during instruction does not work: An analysis of the failure of constructivist, discovery, problem-based, experiential, and inquiry-based teaching. *Educational Psychologist*, *41*(2), 75-86.
99. Knapper, C., & Cranton, P. (Eds.). (2001). Fresh approaches to the evaluation of teaching (New Directions for Teaching and Learning, No. 88). San Francisco: Jossey-Bass.
100. Koehler, M. J., Mishra, P. &Yahya, K. (2007). Tracing the development of teacher knowledge in a design seminar: Integrating content, pedagogy and technology. *Computers & Education*, *49*(3), 740-762.
101. Kudrik, Y., Lahn, L. C. & Morch, A. I. (2009). Technology-enhanced workplace learning: Blended learning in insurance company. In *17th International Conference on Computers in Education. Hong Kong: Asia-Pacific Society for Computers in Education*
102. Kumar, A., Tewari, A., Shroff, G., Chittamuru, D., Kam, M., & Canny, J. (2010). An exploratory study of unsupervised Mobile Learning in rural India. Retrieved from: http://www.cs.cmu.edu/~anujk1/CHI2010.pdf
103. Kumar, D. (2016). Developing and using blends: Evaluating a hybrid micro-skill for new teaching paradigm. *Rupkatha Journal on Interdisciplinary Studies in Humanities (ISSN 0975-2935)*. Special Issue, Vol. VIII, No. 2, 2016.
104. Kurt, S. (2015). ASSURE: Instructional design model. *Educational Technology* Retrieved from https://educationaltechnology.net/assure-instructional-design-model/
105. Kyriazos, T. A., & Stalikas, A. (2018). Applied psychometrics: The steps of scale development and standardization process. Psychology, 9, 2531-2560. Retrieved from: https://doi.org/10.4236/psych.2018.911145

106. L. Messina, S. Tabone (2011). Integrating technology into instructional practices: A training research-intervention with in-service teachers. *REM-Research on Education and Media, 3*(1), 142- 163 (ISSN: 2037-0849)

107. Lakshmi, M.J. & Rao, D.B. (2009).Microteaching and Prospective Teachers. Discovery *Publishing House Pvt. Ltd., New Delhi*. Retrieved from: https://books.google.co.in/books?id=l4c2qIijd3EC&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false

108. Lalima, D. K. &Dangwal, K. L. (2017). Blended learning: An innovative approach. *Universal Journal of Educational Research*, *5*(1), 129-136.

109. Laufenberg (2010). 'How to learn? From mistakes'. In TED presentation.

110. Lave, J. & Wenger, E. *Situated Learning: Legitimate Peripheral Participation*. Cambridge: Cambridge University Press, 1991.

111. Lawshe, C. H. (1975). A quantitative approach to content validity. Personnel Psychology, 28, 563-575. https://doi.org/10.1111/j.1744-6570.1975.tb01393.x

112. Leont'ev, A. N. *Problems of the Development of Mind*. Moscow: Progress Publishers, 1981.

113. Li, Q. & Ma, X. (2010). A meta-analysis of the effects of computer technology on school students' mathematics learning. *Educational Psychology Review*, *22*(3), 215-243.

114. Likert, R. A. (1952). A technique for the development of attitude scales. Educational

115. Lynn, M. R. (1986). Determination and quantification of content validity. Nursing Research, 35, 382-386. https://doi.org/10.1097/00006199-198611000-00017

116. Mackenzie, W. (2012). *Are you a Techno-Constructivist?* Education World. Retrieved from https://www.educationworld.com/a_tech/tech/tech005.shtml

117. Mager, R. F. (1962). Preparing instructional objectives. Belmont, CA: Fearon.

118. Manus, A. L. (1996, December). Procedural versus constructivist education: A lesson from history. In *The Educational Forum*, Vol. 60, No. 4, pp. 312-316. Taylor & Francis Group.

119. Mayer, R. E. (2001). Multimedia learning. New York, NY.

120. Mayer, R. E. *Multimedia Learning.* New York: Cambridge University Press, 2001.

121. Means. B. et al., Evaluation of Evidence-Based Practices in Online Learning. A Meta-Analysis and Review of Online Learning Studies, U.S. Department of Education, Center for Technology in Learning, 2009.

122. Merrill, M.D., Li, Z., & Jones, M.K. (1990b) Second generation instructional design (ID2). Educational Technology, 30(2), 7-14.

123. Miller, R. B. (1962). Analysis and specification of behavior for training. *Training Research and Education: Science Edition.* Nueva York: Wiley.

124. Miller, R.B. (1962). Analysis and specification of behavior for training. In R. Glaser (Ed.), Training research and education. Pittsburgh: University of Pittsburgh Press.

125. Mishra, P. & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record*, *108*(6), 1017-1054.

126. Moreno, R. (2004). Decreasing cognitive load for novice students: Effects of explanatory versus corrective feedback in discovery-based multimedia. *Instructional Science*, *32*(1-2), 99-113.

127. Morgan, K. R. (2002). Blended learning: A strategic action plan for a new campus. *Seminole, FL: University of Central Florida*.

128. Morgan, R.M. (1989). Instructional systems development in third world countries. Educational Technology Research and Development, 37(1), 47-56.

129. Murphy, E. & Manzanares, M. A. R. (2008). Contradictions between the virtual and physical high school classroom: A third-generation Activity Theory perspective. *British Journal of Educational Technology*, *39*(6), 1061-1072.

130. Murphy, P. (2003). The hybrid strategy: Blending face-to-face with virtual instruction to improve large section courses. *University of California Regents. Teaching, Learning, and Technology Center. Retrieved from http://www.uctltc.org/news/2002/12/featureprint.html*

131. Mutlu, G. (2016). A Qualitative Analysis and Comparison of the Two Contemporary Models of Instructional Design. *Online Submission*, *13*(3), 6154-6163.

132. Mutlu, G. (2016). A qualitative analysis and comparison of the two contemporary models of instructional design. *Journal of Human Sciences, 13*(3), 6154-6163.

133. Nagpal, M. (2015). Integration of m-learning strategies in teacher preparation programme. *International Education Conference 2015: Learning Technologies in Education, 739-746.* Excel India Publishers, New Delhi.

134. Nagpal, S. (2000, 2005). Towards total quality management. *DPEP Calling.* January to March 2000 page 31-39.

135. Nagpal, S. (2002). *Interactive Teaching Learning process*. Rajat Publications, New Delhi.

*136.* Napoles, J. & MacLeod, R. B. (2013). The influences of teacher delivery and student progress on preservice teachers' perceptions of teaching effectiveness. *Journal of Research in Music Education, 61(3): 249-261.*

137. NFG (2006). *Educational Technology*. NCERT, New Delhi.

138. NFG (2006). *Teaching of Science*. NCERT, New Delhi.

139. Orey, M. (2002a). *Definition of blended learning.* University of Georgia. Retrieved February 21, 2003, from http://www.arches.uga.edu/~mikeorey/blendedLearning

140. Orey, M. (2002b). *One year of online blended learning: Lessons learned.* Paper presented at the Annual Meeting of the Eastern Educational Research Association, Sarasota, FL.

141. Orlando, J. (2009). Understanding changes in teachers' ICT practices: a longitudinal perspective. *Technology, Pedagogy and Education, 18*(1), 33-44.

142. Osguthorpe, B.R. & Graham C.R. (2003). Blended Learning Environments: Definitions and Directions. *The Quarterly Review of Distance Education*. 4(3).

143. Oxford, R. L. (1997). Constructivism: Shape-shifting, substance, and teacher education applications. *Peabody Journal of education*, *72*(1), 35-66.

144. Pagani, L., & Seghieri, C. (2002). A Statistical Analysis of Teaching Effectiveness from Students' Point of View. *Developments in Statistics*, 17, 197-208.

145. Papert, S. *Mindstorms: Children, Computers, and Powerful Ideas.* New York: Basic Books, 1980.

146. Papert, S. *The Children's Machine.* New York: Basic Books, 1993.

147. Parker, D. & Gemino, A. (2001). Inside online learning: Comparing conceptual and technique learning performance in place-based and ALN formats. *Journal of Asynchronous Learning Networks*, *5*(2), 64-74.

148. Procter, C. T. (2003*). Blended learning in practice*. Retrieved from www.ece.salford.ac.uk/proceedings/papers/cp_03.rtf

149. Prudon, P. (2015). Confirmatory factor analysis as a tool in research using questionnaires: a critique. *Comprehensive Psychology*, *10* (4)

150. Ramesh, A. (2013).Microteaching, an efficient technique for learning effective teaching. *Journal of Research in Medical Sciences*, 18(2), 158–163. Retrieved from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3724377/?report=printable

151. Rani, S. & Kumar, D. (2014). Effectiveness of constructivist teaching approach on secondary school students in Hindi language. (Unpublished M.Ed. thesis). Lovely professional University, Punjab, India.

152. Reay, J. (2001). Blended learning—a fusion for the future. *Knowledge Management Review, 4*(3), 6.

153. Reeves, T. C., & Reeves, P. M. (1997). Effective dimensions of interactive learning on the World Wide Web. *Web-Based Instruction*, 59-66.

154. Reigeluth, C. M. (2013). *Instructional-design theories and models: A new paradigm of instructional theory, Volume II*. Routledge.

155. Reiser, R. A. (2001). A history of instructional design and technology: Part I: A history of instructional media. *Educational Technology Research and Development, 49*(1), 53. Retrieved from https://www.educationworld.com/a_tech/tech/tech005.shtml

156. Richardson, V. (Ed.). (2002). *Handbook of research on teaching*. American Educational Research Association.

157. Roblyer, M. D. & Doering, A. H. (2013). Integrating educational technology into teaching. New Jersey. Pearson Education

158. Rooney, J. E. (2003). Blending learning opportunities to enhance educational programming and meetings. *Association Management*, *55*(5), 26–32.

159. Rossett, A. (2002). *The ASTD e-learning handbook.* New York: McGraw-Hill.

160. Rossett, A., & Frazee, R. V. (2006). Blended learning opportunities. *New York, NY. American Management Association*.

161. Rossett, A., & Garbosky, J. (1987). The use, misuse, and non-use of educational technologists in public education. Educational Technology, 27(9), 37-42.

162. Rovai, A.P., & Jordan, H.M. (2004, August). Blended learning and sense of community: A comparative analysis with traditional and fully online graduate courses. *International Review of Research in Open and Distance Learning*, *5*(2). Retrieved from http://www.irrodl.org/content/v5.2/rovai-jordan.html

163. Russell, M., O'Dwyer, L. M., Bebell, D. & Tao, W. (2007). How teachers' uses of technology vary by tenure and longevity. *Journal of Educational Computing Research*, *37*(4), 393-417.

164. Saville, P., & MacIver, R. (2017). A very good question? In B. Cripps (Ed.), Psychometric testing: Critical perspectives (pp. 29-42). West Sussex, UK: John Wiley & Sons,Ltd.

165. Saxena, A. & Saxena, A. (2015). A viewpoint and attitudes of students' towards future of mobile Learning in education industry of India. *International Journal of Management, MIT College of Management*, Vol. 3, No. 1, January 2015, pp. 18–22.

166. Scriven, M. (1967). The methodology of evaluation. In Perspectives of curriculum evaluation (American Educational Research Association Monograph Series on Curriculum Evaluation, No. 1). Chicago: Rand McNally

167. Scriven, M. (1967). The methodology of evaluation. *Perspectives of curriculum evaluation. Chicago: Rand McNally*

168. Shachaf, P. (2008). Cultural diversity and information and communication technology impacts on global virtual teams: An exploratory study. *Information & Management*, *45*(2), 131-142.

169. Shulman, L. S. (1986). Those who understand: A conception of teacher knowledge. *American Educator, 10*(1).
170. Sikora, A. C., & Carroll, C. D. (2002). Postsecondary education descriptive analysis reports (NCES 2003-154). US Department of Education. *National Center for Education Statistics. Washington, DC: US Government Printing Office*.
171. Singer, F. M. & Stoicescu, D. (2011). Using blended learning as a tool to strengthen teaching competences. *Procedia Computer Science*, *3*, 1527-1531.
172. Singh, G. (2014). Emerging trends and innovations in teacher education. *Indian Journal of Applied Research*, 4(5), 165-168.
173. Singh, H. & Reed, C. (2001). A white paper: Achieving success with blended learning: 2001 ASTD state of the industry report. *Alexandria, VA: American Society for Training & Development*, *200*. Retrieved from http://www.centra.com/download/whitepaper/blendedlearning.pdf
174. Singh, H.(2002). Building effective blended learning programs. *Educational Technology,* 43(6), 51-54.
175. Singh, K., Junnarkar, M., & Kaur, J. (2016). Measures of positive psychology: Development and validation. Berlin: Springer. https://doi.org/10.1007/978-81-322-3631-3
176. Singh, S. (2013). A study of the school experience programme with reference to the development of teaching proficiency and reflective thinking in student teachers. (Unpublished Ph.D. thesis). Jamia Millia Islamia, New Delhi, India.
177. Skinner, B. F. (1954). The science of learning and the art of teaching. *Cambridge, Mass, USA*, *99*, 113.
178. Staker, H. & Horn, M. B. (2012). Classifying K-12 blended learning. *Innosight Institute*. Retrieved from: http://www.christenseninstitute.org/wp-content/uploads/2013/04/Classifying-K-12-blended-learning.pdf
179. Streiner, D. L., Norman, G. R., & Cairney, J. (2015). Health measurement scales: A practical guide to their development and use (5th ed.). Oxford, UK: Oxford University Press. https://doi.org/10.1093/med/9780199685219.001.0001

180. Streiner, D. L., Norman, G. R., & Cairney, J. (2015). Health measurement scales: A practical guide to their development and use (5th ed.). Oxford, UK: Oxford University Press. https://doi.org/10.1093/med/9780199685219.001.0001

181. Sullivan, H.J., & Higgins, N (1983). Teaching for competence. New York: Teachers College press.

182. Swan, K. (2005). A constructivist model for thinking about learning online. *Elements of Quality Online Education: Engaging Communities, 6*, 13-31. In J. Bourne & J. C. Moore (Eds), *Elements of Quality Online Education: Engaging Communities*. Needham, MA: Sloan-C.

183. Swan, K. (2005). A constructivist model for thinking about learning online. In J. Bourne & J. C. Moore (Eds), *Elements of Quality Online Education: Engaging Communities*. Needham, MA: Sloan-C.

184. Theall, M., & Franklin, J. L. (2001). Looking for bias in all the wrong places: A search for truth or a witch hunt in student ratings of instruction? In M. Theall, P. C., Abrami, & L. A. Mets (Eds.), the student ratings debate: Are they valid? How can we best use them? (New Directions for Institutional Research, No. 109) (pp. 45–56). San Francisco: Jossey-Bass.

185. Thomas, D. & Brown, J. S. (2011). *A new culture of learning: Cultivating the imagination for a world of constant change* (Vol. 219). Lexington, KY: CreateSpace.

186. Thomson, I. (2002). *Thomson job impact study: The next generation of corporate learning.* Retrieved from http://www.netg.com/DemosAndDownloads/Downloads/ JobImpact.pdf.

187. Tobin, K. G. (1993). *The practice of constructivism in science education*. Psychology Press.

188. Tondeur et al. (2019). Enhancing pre-service teachers' technological pedagogical content knowledge (TPACK): a mixed-method study. Education *Tech Research Dev*. https://doi.org/10.1007/s11423-019-09692-1

189. Tondeur, J., Aesaert, K., Prestridge, S., & Consuegra, E. (2018). A multilevel analysis of what matters in the training of pre-service teacher's ICT competencies. *Computers & Education, 122,* 32–42.

190. Tondeur, J., Van Braak, J., Sang, G., Voogt, J., Fisser, P., & Ottenbreit-Leftwich, A. (2012). Preparing pre-service teachers to integrate technology in education: A synthesis of qualitative evidence. *Computers & Education, 59*(1), 134–144.

191. Tondeur, J., Van Braak, J., Siddiq, F., & Scherer, R. (2016b). Time for a new approach to prepare future teachers for educational technology use: Its meaning and measurement. *Computers & Education, 94,* 134–150.

192. Tsai, C.-C. (2005). Preferences toward Internet-based Learning Environments: High School Students' Perspectives for Science Learning. *Educational Technology & Society*, *8* (2), 203-213.

193. Tucker, L. R., & Lewis, C. (1973). A reliability coefficient for maximum likelihood factor analysis. Psychometrika, 38, 1-10.

194. Tuckman, B. W. (2002). Evaluating ADAPT: A hybrid instructional model combining web-based and classroom components. *Computers & Education*, *39*(3), 261-269.

195. Tuovinen, J. E. &Sweller, J. (1999). A comparison of cognitive load associated with discovery learning and worked examples. *Journal of Educational Psychology*, *91*(2), 334.

196. Tyack, D. & Cuban, L. (2000). Teaching by machine. *Technology and Learning*, 247-254.

197. Valiathan, P. (2002). Blended learning models. *Learning Circuits*, *3*(8), 50-59. Retrieved from http://purnima-valiathan.com/wpcontent/uploads/2015/09/Blended-Learning-Models-2002-ASTD.pdf

198. Vernadakis, N., Giannousi, M., Derri, V., Michalopoulos, M. & Kioumourtzoglou, E. (2012). The impact of blended and traditional instruction in students' performance. *Procedia Technology*, *1*, 439-443.

199. Von Glasersfeld, E. (1995). Radical Constructivism: A Way of Knowing and Learning. Studies in Mathematics Education Series: 6.

200. Vyas, N., & Nirban, V. S. (2014). Students' perception on the effectiveness of mobile learning in an institutional context. *ELT Research Journal*, 26–36.

201. Vygotsky, L. S. (1978). Mind in society (M. Cole, V. John-Steiner, S. Scribner, & E. Souberman, Eds.).

202. Vygotsky, L. S. *Thought and Language*. Cambridge, MA: MIT Press, 1962.

203. Vygotsky, L.S. *Mind in Society*. Cambridge, MA: Harvard University Press, 1978.

204. Waltz, C. W., & Bausell, R. B. (1981). Nursing research: Design, statistics and computer analysis. Philadelphia, PA: F.A. Davis.

205. Wang, C., Ke, Y., Wu, J., & Hsu, W. (2011). Collaborative action research on technology integration for science learning. *Journal of Science and Educational Technology, (2012),* 21:125–132.

206. Ward, J., & LaBranche, G. A. (2003). Blended learning: The convergence of e-learning and meetings. *Franchising World*, *35*(4), 22–23.

207. Watson, J. & Murin, A. (2014, January). A history of K-12 online and blended instruction in the United States. In *Handbook of Research on K-12 Online and Blended Learning* (pp. 1-23). ETC Press.

208. White, R. (2001). The revolution in research on science teaching. *Handbook of Research on Teaching*, *4*, 457-471.

209. Wilson, S. M. & Wineburg, S. S. (1993). Wrinkles in time and place: Using performance assessments to understand the knowledge of history teachers. *American Educational Research Journal*, *30*(4), 729-769.

210. Wilson, S. M. (2001). Research on history teaching. *Handbook of research on teaching*, *4*, 527-544.

211. Wineburg, S. S. & Wilson, S. M. (1991). Subject matter knowledge in the teaching of history. *Advances in Research on Teaching*, *2*, 305-347.

212. Wood, T., Nelson, B. S. & Warfield, J. E. (Eds.). (2014). *Beyond classical pedagogy: Teaching elementary school mathematics*. Routledge.

213. Yadav, S. K. (2011). A Comparative study of pre-service teacher education programme at secondary stage in Bangladesh, India, Pakistan and Sri Lanka. *Indian Educational Review*, 48(1), 96-110.

214. Yasemin, G. (2008). Improving the technology integration skills of prospective teachers through practice: a case study. *The Turkish Online Journal Of Educational Technology*. ISSN: 1303-6521 volume 7 issue 4

215. Young, J. R. (2002, March 22). “Hybrid” teaching seeks to end the divide between traditional and online instruction. *Chronicle of Higher Education,* p. A33.

216. Zhao, Y., Pugh, K., Sheldon, S. & Byers, J. L. (2002). Conditions for classroom technology innovations. *Teachers College Record, 104*(3), 482-515

# APPENDICES

## Appendix A

## MODEL LESSON PLANS

## MODEL LESSON PLAN IN ENGLISH

**Subject: Pedagogy of English** **Duration: 40 min.**
**Class: 7th** **Date:**
**Topic: Desert**

**Specific objectives:** After the completion of the lesson the learners:

1. Write apt description of desert as specialist see to it.
2. Enlist major characteristics of a desert.
3. Discuss the features of deserts with peers and family members.
4. Collect information about life style of peoples living in hot and cold deserts.
5. Appreciate and discuss the ecological diversity of Indian land with others.
6. Analyze the significance of an oasis in a desert.

**Specific teaching aids:**
**Traditional face-two-face:** Book
**Online teaching aids:** Videos on desert-hot and cold, Smartphone for dictionary, translator and grammar reference

**Learning organization:** Student teacher takes attendance, checks homework and makes contextual statements to settle down the class as early as possible. She checks for Internet connectivity in smartphones.

## Teaching- Learning process:

| Expected Content | Presentation of Problematic event/ data/case | Hypotheses Formulation & Justification | Explanation | Increasing Critical Awareness | Assessment & Reflection |
|---|---|---|---|---|---|
| **Desert- meaning and features**<br><br>**(Those of us------------- any tropical garden)** | Student teacher asks learners to raise their hands who have visited desert and allows one of the learners to present features of desert.<br>She shows a small video on desert and asks learners to write their own definition and features of desert.<br>She tells to open chapter 3 'The Desert' from An Alien Hand.<br>She first reads the first two paragraphs from the book and asks learners to read these paragraphs and write meanings of difficult words. | Learner says<br>1. Desert is a place full of sand.<br>2. There are very less water and plants.<br>3. There are very less animals in the desert.<br><br>Learners write definition and features as per their understanding.<br><br>Learners use smartphones to search meanings of difficult words like Region, Stretch, Bloom, Sight, Tropical etc. | Learner explains that it is incorrect to say that desert is a dry, hot, waterless place without plants and animals. It is a beautiful place with variety of plants, animals and peoples.<br><br>Student teacher appreciates the explanation and further adds that plants, animals and peoples have adapted to live in hot and dry conditions of desert. During rainy days, the desert flowers bloom and it look like a green garden. | Search for following thing:<br>1. Five desert plants<br>2. Five desert animals<br>3. five desert flowers (share the information with peers)<br><br>Name the states of India where we can found desert.<br><br>Student teacher arranges a video call with her friend (as expert) living in Rajasthan. Learners discuss the life of people in desert with the expert. | From the first paragraph<br>(i) pick out two phrases which describe the desert as most people believe it is;<br>(ii) pick out two phrases which describe the desert as specialists see it.<br><br>Which do you think is an apt description, and why? |

| Expected Content | Presentation of Problematic event/ data/case | Hypotheses Formulation & Justification | Explanation | Increasing Critical Awareness | Assessment & Reflection |
|---|---|---|---|---|---|
| **(A desert is---------- shifting sands)** | Student teacher shows videos on Thar and Ladhakh deserts and asks learners to see for differences.<br><br>She reads next two paragraphs and asks learners to read these paragraphs and write meanings of difficult words. | Learners write<br>1. Desert can be hot or cold.<br>2. Desert can have mountains and hills.<br><br>Learners use smartphones to search meanings of difficult words like Springs, Heaps, Mounds etc. | Learner says that a desert is not always a wasteland. In the middle of the desert, there are places called as oasis.<br><br>Student teacher further explains that an oasis is a big or small green island in the middle of the desert spring and well gives plants and animals a better chance to grow. But some deserts are totally without water where | Search for two example each for hot and cold desert.<br><br>Collect information about the lifestyle of people living in cold and hot desert areas—their food, clothes, work, social customs, etc. (Share this information with the group) | **Match phrases of Column A with Column B.**<br><br>**Column A**<br>(i) an endless stretch of sand<br>(ii) waterless and without<br>(iii) an oasis<br>(iv) hidden by a cover of grass<br><br>**Column B**<br>a. fertile place with water and plants in a desert<br>b. not visible because the grass shelter is thick<br>c. nothing but sand as far as one can see |

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|---|---|---|---|---|---|
| | | | heaps of sands called 'sand dunes' get formed. Contrary to this there are cold deserts also like one in ladakh. | | d. no water and no shade |

**Recapitulation**

Today, we have discussed about desert, its features, plants and animals.

1. Describe desert in your own words
2. Enlist major characteristics of a desert.
3. What is the life style of peoples living in hot and cold deserts?
4. What is the importance of an oasis in a desert?

**Homework**

1. Describe a desert in your own way. Write a paragraph and read it aloud to your classmates.
2. Go to the library and collect information about the lifestyle of people in desert areas— their food, clothes, work, social customs, etc. Share this information with the group.

## MODEL LESSON PLAN IN MATHEMETICS

**Subject:** Mathematics **Duration: 40 min.**
**Class: 7th** **Date:**
**Topic:** Fraction: Multiplication

**Learning objectives:**

After the completion of the class, learner will:

i) Write examples of different types of fractions.
ii) Explain multiplication of fractions by whole number.
iii) Solves problems related to multiplication of fractions by a whole number.
iv) Describe multiplication of fraction by another fraction.
v) Solves problems related to multiplication of fractions by a fraction.

**Instructional support:**

**Traditional Face-two-Face Resources:** Ribbon, Paper strips
**Online Learning Resources:** Laptop with internet**,** Projector, Video on Fractions and its type, and animation video on multiplications of fractions.

**Learning organization:**

Student teacher takes attendance, checks homework and makes contextual statements to settle down the class as early as possible. He places two computers on the last benches as two working stations for learners to work during the teaching learning process. He checks for Internet connectivity.

**Teaching- Learning process**

| Expected Content | Presentation of Problematic event/ data/case | Hypotheses Formulation & Justification | Explanation | Increasing Critical Awareness | Assessment & Reflection |
|---|---|---|---|---|---|
| Multiplication of fraction: by a whole number | Student teacher shows a video on internet regarding fractions and its type and asks learners to write types of fractions | Learners write types of fractions<br>1. Proper Fraction<br>2. Improper | Learner will say in order to find the area first convert the mixed fraction into fraction and multiply the | 1. What is ½ of 10?, ¼ of 16?, and 2/5 of 25? | Q.1. In a class of 40 students, $\frac{1}{5}$ of the students like to study English, $\frac{2}{5}$ of the total |

| | | | | | |
|---|---|---|---|---|---|
| | with examples. She further gives following problems<br>1. Nikhil solved 2/7 part of work, whereas Rekha solved 4/5 of it. Who solved lesser part?<br>2. Suman studies for $5\frac{2}{3}$ hours daily. She devotes $2\frac{4}{5}$ hours of her time for Science and Maths. How much time does she devote for other subjects?<br>3. Find out the area of the rectangle if its length and breadth are $7\frac{1}{2}$ cm and 3cm respectively. | Fraction<br>3. Mixed Fraction<br>4. Equivalent Fraction<br><br>1. Nikhil solved lesser part of work<br><br>2. Suman devotes $2\frac{13}{15}$hours for other subjects<br><br>3. Area can be $\frac{15}{2}$ X 3<br>**How to multiply a fraction with whole number?** | fraction with whole number.<br>Student teacher further explains that To multiply a whole number with a PROPER or an IMPROPER FRACTION, we multiply the numerator of the fraction with whole number, keeping the denominator same.<br>For example,<br>$\frac{15}{2}$ X 3 = 45/2cm2.<br>She further adds Fraction is denoted by an OPERATOR 'OF'. | 2. Farida has 20 marbles. Reshma has 1/5th of the number of marbles what Farida has.<br>How many marbles Reshma has? | number like to study Maths and the remaining students like to study Science.<br>(i) How many students like to study English?<br>(ii) How many students like to study Maths?<br>(iii) What fraction of the total number of students likes to study Science? |

| Expected Content | **Presentation of Problematic event/ data/case** | **Hypotheses Formulation & Justification** | **Explanation** | **Increasing Critical Awareness** | **Assessment & Reflection** |
|---|---|---|---|---|---|
| Multiplication of a fraction by a fraction | Student teacher cuts the 9 cm long ribbon strip into four equal parts by folding it twice.<br>She asks<br>1. What fraction of the total part each part will | Learners write<br>1. Each part is $\frac{9}{4}$ of the strip.<br><br>The last part represents as$\frac{1}{2}$ $of$ $\frac{9}{4}$. | Learners explain<br>If we multiply two fractions, firstly we multiply the numerators and then the denominator.<br>For example: If we want to multiply $\frac{2}{3}$ with $\frac{7}{5}$ we will multiply 2×7 and then 3×5 and | 1. Which is greater:<br><br>$\frac{2}{7}$ of $\frac{3}{4}$ or $\frac{3}{5}$ of $\frac{5}{8}$.<br><br>**2.** Lipika reads a book for $1\frac{3}{4}$ hours every day. She | 1. Provide the number in place of '?' , such that $\frac{2}{3}X\ ?=\frac{10}{30}$<br><br>(ii) The simplest form of the number obtained |

| | | | | | |
|---|---|---|---|---|---|
| | represent.<br><br>She takes one of the parts and again divides it into two equal parts.<br><br>How will you represent it? | It is $\frac{1}{2} X \frac{9}{4}$.<br><br>How will you multiply a fraction with a fraction? | will represent as $\frac{14}{15}$.<br>Student teacher appreciates the answer and also adds few facts along with the formula<br>• The product of 2 improper fractions is greater than each of the two fractions<br>• Product of an improper fraction and a proper fraction is greater than the proper fraction<br>For example:<br>$\frac{2}{3} \times \frac{7}{5} = \frac{14}{15}$<br>Where $\frac{14}{15} < \frac{7}{5}$<br>and $\frac{14}{15} > \frac{2}{3}$ | reads the entire book in 6 days. How many hours in all were required by her to read the book? | in is _____.<br><br>2. Saili plants 4 saplings, in a row, in her garden. The distance between two adjacent saplings is $\frac{3}{4}$ m. Find the distance between the first and the last sapling. |

**RECAPITULATION**:

Today, we have discussed about multiplication of fraction with whole number and other fraction.

1. Describe the types of fractions by giving appropriate examples.
2. Multiply and express as a mixed fraction:
   i. (a) 3X $5\frac{1}{5}$ (b) 5X6 $\frac{3}{4}$ (c) 7X $2\frac{1}{4}$
3. Multiply the following fractions:

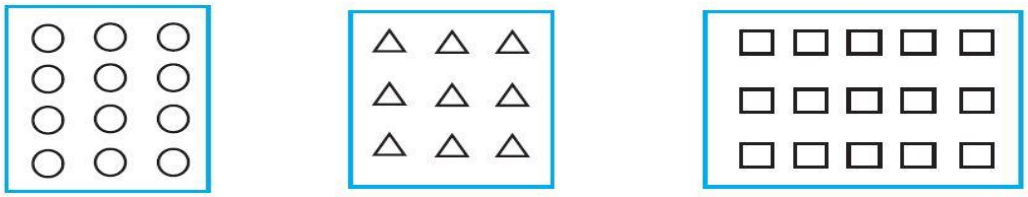
(i) $\frac{2}{5} \times 5\frac{1}{4}$ (ii) $6\frac{2}{5} \times \frac{7}{9}$ (iii) $\frac{3}{2} \times 5\frac{1}{3}$

**HOME WORK:**

**1.**

Shade: (i) $\frac{1}{2}$ of the circles in box (a) (ii) $\frac{2}{3}$ of the triangles in box (b)

(iii) $\frac{3}{5}$ of the squares in box (c).



(a) (b) (c)

2.

Vidya and Pratap went for a picnic. Their mother gave them a water bottle that contained 5 litres of water. Vidya consumed $\frac{2}{5}$ of the water. Pratap consumed the remaining water.

(i) How much water did Vidya drink?

(ii) What fraction of the total quantity of water did Pratap drink?

**MODEL LESSON PLAN IN SOCIAL SCIENCE**

**Subject: Social Science** **Duration: 40 min.**
**Class: $6^{th}$** **Date:**
**Topic: Globe: Latitudes**

**Learning Outcomes:**

1) Describe the Globe.
2) Write names of different continents.
3) Enlist different oceans.
4) Define latitude.
5) Search for important parallels of latitudes on internet.
6) Locate different places on earth with the help of globe.
7) Appreciate mother earth for its diversity.

**Instructional support:**

**Traditional Face-two-Face Resources:** Globe
**Online Learning Resources:** Picture of Earth showing Latitudes, Video on globe and latitudes.

**Learning organization:** Student teacher takes attendance, checks homework and makes contextual statements to settle down the class as early as possible. He places two computers on the last benches as two working stations for learners to work during the teaching learning process. He checks for Internet connectivity.

## Teaching- Learning process

| Expected Content | Presentation of Problematic event/ data/case | Hypotheses Formulation & Justification | Explanation | Increasing Critical Awareness | Assessment & Reflection |
|---|---|---|---|---|---|
| **Globe** | Student teacher points towards the model of globe and asks learners to observe it.<br>He further asks following questions:<br>1. What is this?<br>2. What it represents?<br>3. What is shown on it? | Learners observe carefully and say -<br>1. This is a globe.<br>2. It represents our Planet earth.<br>3. It is a miniature form of our earth.<br>4. The different countries are shown on it.<br><br>Student teacher asks learners to define globe. | Learners explain that globe is a miniature model of earth which shows exact location of places.<br>Student teacher says<br>Yes, globe is a miniature model of earth. With the help of globe he further explains that a needle is fixed through globe in tilted manner, which is its axis. North axis represents north pole of the earth and south axis represents south pole. Globe is not fixed. We can rotate the globe same as earth rotates from west to east. | What is the color of most part of globe and why? | 1) What is the Globe?<br>2) What is shown on the Globe?<br>3) In what manner Globe is fixed? |

| Expected Content | Presentation of Problematic event/ data/case | Hypotheses Formulation & Justification | Explanation | Increasing Critical Awareness | Assessment & Reflection |
|---|---|---|---|---|---|
| **Description of Globe** | Student teacher shows a video describing the globe and asks learners to write important points. | Learners writes<br>1. Globe shows all the land masses and water bodies that cover our planet earth.<br>2. Colored parts are the land forms and blue part is water.<br>3. There are 7 continents and 5 oceans.<br>4. There are latitudes and longitudes on the globe. | Learners explains<br>There are 7 continents which are Asia, Europe, Africa, Australia, South America, North America and Antarctica.<br>There are 5 oceans. These are Indian, Pacific, Atlantic, Southern and Arctic ocean.<br><br>Student teacher confirms the explanations of students and gives appropriate reinforcements. | Learner rotates through rotation model of blended learning and find out the answers of following questions using internet:<br><br>Which is the largest ocean? (Pacific Ocean)<br><br>How much area is covered by Pacific ocean? (30%)<br><br>Which is the largest continent? (Asia)<br>How knowledge of latitudes and longitudes is helpful? | 1) Give brief description of globe.<br><br>2) Name different continents.<br><br>3) Enlist different oceans on the earth. |

| Expected Content | Presentation of Problematic event/ data/case | Hypotheses Formulation & Justification | Explanation | Increasing Critical Awareness | Assessment & Reflection |
|---|---|---|---|---|---|
| **Latitudes** | Student teacher shows a picture of lattitudes drawn on globe and directs learners to write their observations. | Learners explore that:<br>1. An imaginary line, called equator, divides the globes in to two equal halves; Northern Hemisphere and Southern Hemisphere.<br>3. Parallels circles from equators to poles are called as parallels of latitudes. Student teacher further asks learners to read parellels of latitudes. | Learners explains<br>Equator acts as a reference point to locate places on earth. The parallels north to the equator are called as north latitude and parallels south to equator as south latitudes.<br><br>Student teacher further explains that the 90 degree north latitude marks north pole and 90 degree south latitude marks south pole. So, the value of each latitude is followed by either south (S) or north (N). For example 20˚ N Latitude or 20˚ S Latitude. | Learner rotates through rotation model of blended learning and find out the important latitudes.<br><br>Find out the locations of<br>I. Tropic of Cancer<br>II. Tropic of Capricorn<br>III. Arctic Circle<br>IV. Antarctic circle | 1. Define Parallel of latitude?<br><br>2. Enlist important Parallel of latitudes.<br><br>3. How we measure latitudes?<br>A) In Kilometers<br>B) In centimeters<br>C) In degrees<br>4. How are latitudes useful?<br>A)To calculate time<br>B)To locate places<br>C) To see earth movement |

**Recapitulation**

Today we discussed about the globe and parallels of latitudes.

1. What is Globe?
2. Write names of different continents.
3. Enlist different oceans.
4. What are parallel of latitudes?
5. Enlist important parallels of latitudes on internet.
6. Locate the following places on earth with the help of globe
    - Dhubri in Assam
    - Chandrapur in Maharashtra (India) and
    - Belo Horizonte in Brazil (South America)

**Homework**

1. What is Globe?
2. What are parallel of latitudes? Enlist important parallels of latitudes on internet.
3. Draw a diagram of the globe showing the earth's axis, the Equator, Tropics of Cancer and Capricorn, Arctic Circle and Antarctic Circle.

# मॉडल पाठ योजना हिन्दी

**विषय:** हिन्दी **अवधि :** 40 मिनट
**कक्षा:** 7th **दिनांक :** 06-11-20
**उप-विषय:** हम पंछी उन्मुक्त गगन के (कविता)

**विशेष उद्देश्य:**

क) शिक्षार्थी 'हम पंछी उन्मुक्त गगन के' कविता का अनुकरण वाचन करेंगे।
ख) शिक्षार्थी पठित कविता के माध्यम से आज़ादी की महता पर विचार प्रस्तुत करेंगे।
ग) शिक्षार्थी पंछियों की देख-रेख पर दस पंक्तियाँ लिखेंगे और सहपाठियों को सुनायेंगे।
घ) शिक्षार्थी कविता में आये पद्यांशों की प्रसंग सहित व्याख्या करेंगे।

**विशेष सहायक सामग्री:**

परम्परागत सहायक सामग्री: पाठ्यपुस्तक।

**ऑनलाईन सहायक सामग्री:** कविता से सम्बंधित विडियो, मोबाइल )व्याकरण उपयोग(, पंछियों से सम्बंधित ब्लॉग ।

**शिक्षण संगठन:** छात्र शिक्षिका उपस्थित होती है। गृहकार्य की जांच करती है और कक्षा को यथाशीघ्र व्यवस्थित करने के लिए प्रासंगिक वक्तव्य देती है। वह स्मार्ट फ़ोन को इन्टरनेट के लिए जांच करती है।

| अपेक्षित विषय वास्तु | समस्या / घटना डेटा प्रस्तुति | परिकल्पना निरूपण और औचित्य | व्याख्या | आलोचनात्मक जागरूकता को बढ़ाना | मूल्यांकन एवं मीमांसा |
|---|---|---|---|---|---|
| **हम पंछी ........विघ्न न डालो**।<br><br>**हम पंछी ......पंख टूट जायेंगे**। | छात्र शिक्षिका शिक्षार्थियों को कहती है कि बहुत से लोग पक्षी पालते हैं।<br>क) पक्षियों को पालना उचित है अथवा नहीं ? अपने विचार लिखिए।<br>ख) क्या आपने या आपकी जानकारी में किसी ने कोई पक्षी पाला है? उसकी देख-रेख किस प्रकार की जाती है? लिखिए।<br><br>वह अध्याय -1 को खोलने के लिए | शिक्षार्थी अपने-2 विचार लिखेंगे और कक्षाकक्ष में प्रस्तुत करेंगे।<br><br>शिक्षार्थी पक्षियों की देख-रेख पर दस पंक्तियाँ लिखेगें और प्रस्तुत करेंगे।<br><br>शिक्षार्थी विडियो | शिक्षार्थी लिखते हैं- यह पंक्तियाँ कविता 'हम पंछी उन्मुक्त गगन के' जो कि कक्षा सात की हिन्दी पाठ्यपुस्तक भाग-2 से ली गई हैं, यह कविता कवि शिवमंगल सिंह सुमन द्वारा लिखित है।<br><br>शिक्षार्थियों की व्याख्या की सराहना करते हुए छात्र शिक्षिका कहती है- इस कविता में कवि पिंजरे में बंद पंछी | क्या आपको लगता है कि मानव की वर्तमान जीवन शैली और शहरीकरण से जुडी योजनायें पक्षियों के लिए घातक है? कैसे?<br><br>पक्षियों से रहित वातावरण में कौन-2 सी समस्याएं पैदा हो सकती है? | कविता की पहली चार पंक्तियों का प्रसंग लिखिए।<br><br>पक्षियों को पिंजरे में बंद करने से केवल उनकी आज़ादी का हनन ही नहीं होता अपितु पर्यावरण भी प्रभावित होता है। |

| | | | | | |
|---|---|---|---|---|---|
| | कहेंगी। वह बतायेइगी कि आज हम शिव मंगल सिंह सुमन द्वारा लिखित कविता हम पंछी उन्मुक्त गगन को पढेंगे।<br>वह कविता से सम्बंधित एक विडियो दिखाती है, जिसमें कविता को पढ़कर सुनाया गया है। | धयान से सुनते हैं और इसका अनुकरण वाचन करते हैं।<br><br>छात्रा शिक्षिका शिक्षार्थियों को कविता की पहली चार पंक्तियों का प्रसंग लिखने को कहती है। | की इच्छाओं के बारे में संक्षेप में बताते हैं कि वह उन्मुक्त होकर अपनी कौन-2 सी इच्छाएं पूरी करना चाहते हैं। | | इस पर दस पंक्तियों में अपने विचार लिखिए। |
| **हम पंछी ..........पंख टूट जायेंगे। )सरलार्थ(** | छात्रा शिक्षिका शिक्षार्थियों को पहले पद्यांश में आये कठिन शब्दों के अर्थ ढूँढने को कहती है-<br>उन्मुक्त-<br>पिंजरबद्ध –<br>कनक-<br>पुलकित-<br><br>और पंक्तियों की व्याख्या करने को कहती है। | शिक्षार्थी कठिन शब्दों के अर्थ लिखते हैं।<br><br>उन्मुक्त- खुला<br>पिंजरबद्ध- पिंजरे में बंद<br>कनक- सोना<br>पुलकित- कोमल<br><br>अर्थो के आधार पर शिक्षार्थी पंक्तियों का सरलार्थ करते हैं। | शिक्षार्थी लिखते हैं पंछी कह रह है कि हम आकाश में उडने वाले हैं। पिंजरे में बंद रहने से हमारे कोमल पंख पिंजरे की दीवारों से टकराकर टूट जायेंगे।<br><br>शिक्षार्थियों की व्याख्या की सराहना करते हुए छात्र शिक्षिका कहती है-<br><br>कवि पक्षियों की ओर से कह रह है कि | कनक तीलियों में कौन-सा विशेषण प्रयोग हुआ है? | खुले वातावरण में रहने वाले पक्षियों को पिंजरे में बंद |

| | | | | | |
|---|---|---|---|---|---|
| | | | हमारा बसेरा खुला आकाश है। हम उड़ाते हुए ही ख़ुशी के गीत गा सकते हैं। यदि हमें पिंजरे में बंद कर दिया जाए तो हम चहचहाना भूल जायेंगे। आज़ादी पाने की इच्छा में हमारे कोमल पंख सोने की सलाखों से टकराकर टूट जायेंगे। | इन पंक्तियों का भाव अपने शब्दों में लिखें। | करने से क्या होगा? |

**पुनरावृति:** आज हमने शिवमंगल सिंह सुमन द्वारा रचित कविता हम पंछी उन्मुक्त गगन के बारे में पढ़ा कि कैसे कवि ने पंछियों के माध्यम से आज़ादी की महत्ता के बारे में बताया है।

1. कविता का भाव बताइए।
2. पंछियों की देख-रेख कैसे करनी चाहिए?
3. कविता की पहले चार पंक्तियों की प्रसंग सहित व्याख्या कीजिए।

**गृहकार्य :**

1. पिंजरे में बंद पंछी को क्या चिंता सता रही है?
2. यदि आपके घर के किसी स्थान पर किसी पक्षी ने अपना आवास बनाया है और किसी कारणवश आपको अपना घर बदलना पद रहा है। तो आप इस पक्षी के लिए किस तरह के प्रबंध करना आवश्यक समझेंगे? लिखिए।

**Appendix B**

**Worksheet I**

**Roll No. :** **Topic:** Human body & its movements

Class: **Date:**

**Instructions:** In column A you need to write the body part used for movement and in column B you need to write the way they move.

Do as per the given example.

| Animal | Body part used for moving from place to place | How does the animal move? |
|---|---|---|
| Cow | Legs | Walk |
| Humans | | |
| Snake | Whole body | Slither |
| Bird | | |
| Insect | | |
| Fish | | |

**Remarks of Teacher:**

**Signature:**

**Appendix C**

**Worksheet II**

**Roll No. :** **Topic:** Human body & its movements

Class: **Date:**

**Instructions:** In column A you need to write the body part used for movement and in column B you need to write the way they move. Do as per the given example.

| **Body part** | **Find out the type of movement** | | | | |
|---|---|---|---|---|---|
| | **Rotates completely** | **Rotates partly/turns** | **Bends** | **Lifts** | **Does not move at all** |
| Neck | | Yes | Yes | Yes | |
| Wrist | | | | | |
| Arm | | | | | |
| Knee | | | | | |
| Head | | | | | |

**Remarks of Teacher:**

**Signature:**

## Appendix: D

**Observations/ Suggestions of expert on CBIP and lesson plans**

| S. No. | Expert | Observations/ Suggestions |
|---|---|---|
| 1 | **Prof. Md. Akhtar Siddique Former Director, NCTE, New Delhi** | Thematic analysis was excellent. Explore impact of technology on existing approaches/theories. Syntax of model is fine. Keep Indian conditions in considerations. Lesson plans are reflecting model in question. Appropriate blending is there in lesson plan. It is good for learners. |
| 2 | **Prof. Saroj Pandey Professor & Head IGNOU New Delhi** | Good Attempt to develop CBIP. Model as per focus. Design Ok. Revise point 3 and 4. Make it more constructivist like plan constructivist strategies, define role of teachers and students. Lesson plans are fine. |
| 3 | **Dr. Vijayan Associate professor NCERT New Delhi** | Design should have flexibility. Inclusion of PISA considerations is reflected in evaluation. Add reflection. Theoretically model is perfect and shows blending of constructivism with technology. Apply integrated approaches in evaluation also (as discussed in theory of model). Add more variations in learning outcomes. |
| 4 | **Prof. P. Kaul Professor and head Amity University, Noida** | As discussed earlier, the skills like communication, collaboration, critical thinking, creativity and complex problem solving are reflected in model and lesson plans. The scale dimensions matches with theory and are also reflecting in lesson plans. Model and lessons are fine. Lessons should vary but basic idea should remain intact. |
| 5 | **Dr. Harjeet kaur Associate professor (Retd.) MGN College of Education, GNDU Amritsar** | Plan shows blended strategies. Both traditional and modern resources used judiciously. Worksheets, animated videos, talks with experts, diagram making etc included in lessons. Best part is planning of strategies in advance. Model and lesson plans are contextual. |
| 6. | **Dr. Arun Kulshrest Professor in Education DEI, Agra** | No such comprehensive model covering techno constructivism blended learning strategies and different existing theories have been developed earlier. It's comprehensive and holistic. Lesson plans on science and mathematics are well prepared and covering all aspects of model. In times to come more researches will establish the model for Indian system. |
| 7. | **Mrs. Sarla Mishra Principal, BSF Sen. Sec. School,** | Lesson plans are activity based for higher level of learning. Module formation is helpful for both teacher and student. Technology has been used. |

| | | |
|---|---|---|
| | **Jalandhar** | Use of dictionary and Wikipedia is interesting and motivating (English lesson). Model is comprehensive, good for developing skilled teachers. All skills taken in to consideration. |
| **8.** | **Prof. Kusum Sharma**<br>**JMI New Delhi** | As discussed earlier changes are incorporated like giving original steps as per theory of model, developing more model blended strategies, consideration of Digital Bloom taxonomy in developing objectives. Plan traditional and online resources separately in lessons. Make Learning organization a part of lesson plan. |
| **9.** | **Prof. Aruna Anand**<br>**Former Head, Dept. of Education, GNDU** | Thematic analysis of basic models done. Flexibility incorporated through variety of activities, inclusiveness reflected in model and lessons. Emphasis on blending strategies is good. Techno-constructivism, digital Bloom taxonomy incorporations are well justified. Lessons are fine and blended. More researches will validate the model further. |
| **10.** | **Dr. Monica Nagpal**<br><br>**Associate professor, CTE** | The model emphasises on all the aspects. It allows teachers to be well versed with not only their content but also for accessing variety of resources, exploring other tools and faciliatating learning. Indian schools are going to evolve at high speed and model like this are going to be helpful in the process. LP is based on the model and depicts all aspects of the model. |

**Appendix: E (i)**
**Expert suggestions on CBIP and lesson plans**

**Name of the Expert: Dr. Saroj Pandey, Professor & Head, IGNOU, New Delhi**
**Dated: June 2017**

| S. No. | Parameters | Yes | No | Modification required | Remarks |
|---|---|---|---|---|---|
| 1 | **Model is as per focus (**Construction of knowledge, Development & use of appropriate blends, Preparing professional and humane teachers, Developing teaching effectiveness of student teachers, Improving academic achievement of learners) | yes | | | |
| 2 | Designing of model in to focus, syntax, and social system, principle of reaction, support system and application is making it more comprehensive and accurate. | | | | **Revise point 3 and 4** |
| 3 | Operations of the Planning phase (attached) are appropriate | yes | | | |
| 4 | Operations of the Implementation phase (attached) are appropriate | Yes | | | |
| 5 | Operations of the Evaluation phase (attached) are appropriate | yes | | | |
| 6 | Model shows appropriate blends of traditional and online resources | Yes | | | **But shift more towards constructivism** |
| 7 | Theoretical framework of model is appropriate to Indian schools. | Yes | | | **Very Good** |
| 8 | Model is Constructivist | Yes | | | |

| | | | | | |
|---|---|---|---|---|---|
| | Blended and situational | | | | |
| **9** | Lesson plan format (Attached) is as per the model. | **Yes** | | | |
| **10** | The model lesson plans (attached) depicts the theoretical rationale of paradigm | **Yes** | | | |
| **11** | Lesson plans show appropriate blends of traditional and online resources | **Yes** | | | |

**THANKS**

**Appendix: E (ii)**

**Name of the Expert: Dr. Vijayan, Associate Professor, NCERT, New Delhi**

**Dated: July 2017**

| S. No. | Parameters | Yes | No | Modification required | Remarks |
|---|---|---|---|---|---|
| 1 | **Model is as per focus (**Construction of knowledge, Development & use of appropriate blends, Preparing professional and humane teachers, Developing teaching effectiveness of student teachers, Improving academic achievement of learners) | √ | | | The model explores the possibility of connecting ICT in an Constructivist classroom |
| 2 | Designing of model in to focus, syntax, and social system, principle of reaction, support system and application is making it more comprehensive and accurate. | √ | | | Agree with the fact But care should be given for flexibility in the design also |
| 3 | Operations of the Planning phase (attached) are appropriate | √ | | | NCERT has come up with Learning Outcome. During this phase, it would be better to highlight the LOs and may be connected it with Pedagogical Processess. |
| 4 | Operations of the Implementation phase (attached) are appropriate | √ | | | |

| | | | | | |
|---|---|---|---|---|---|
| **5** | Operations of the Evaluation phase (attached) are appropriate | √ | | | The use of Peer Assessment and Self assessment also as a part of FA may be highlighted |
| **6** | Model shows appropriate blends of traditional and online resources | √ | | | |
| **7** | Theoretical framework of model is appropriate to Indian schools. | √ | | | |
| **8** | Model is Constructivist Blended and situational | √ | | | |
| **9** | Lesson plan format (Attached) is as per the model. | √ | | | The learning Outcome mentioned in the model lesson plans needs to relook. They seems to be content specific objective |
| **10** | The model lesson plans (attached) depicts the theoretical rationale of paradigm | √ | | | |
| **11** | Lesson plans show appropriate blends of traditional and online resources | √ | | | If possible, some e-assessment examples also may be provided |

**THANKS**

**Appendix: E (iii)**

**Name of the Expert: Prof. P. Kaul, Professor & Former Head, Amity University, Noida**
**Dated: July 2017**

| **S. No.** | **Parameters** | **Yes** | **No** | **Modification required** | **Remarks** |
|---|---|---|---|---|---|
| 1 | **Model is as per focus** (Construction of knowledge, Development & use of appropriate blends, Preparing professional and humane teachers, Developing teaching effectiveness of student teachers, Improving academic achievement of learners) | **Y** | | | skills like communication, collaboration, critical thinking, creativity and complex problem solving are reflected in model and lesson plans. |
| 2 | Designing of model in to focus, syntax, and social system, principle of reaction, support system and application is making it more comprehensive and accurate. | **Y** | | | The scale dimensions matches with theory and are also reflecting in lesson plans. Model and lessons are fine. |
| 3 | Operations of the Planning phase (attached) are appropriate | **Y** | | | |
| 4 | Operations of the Implementation phase (attached) are appropriate | **Y** | | | |
| 5 | Operations of the Evaluation phase (attached) are appropriate | **Y** | | | Reflection is highlighted. Good. |
| 6 | Model shows appropriate blends of traditional and online resources | **Y** | | | |
| 7 | Theoretical framework of model is appropriate to Indian schools. | **Y** | | | |
| 8 | Model is Constructivist | **Y** | | | |

| | | | | | |
|---|---|---|---|---|---|
| | Blended and situational | | | | |
| **9** | Lesson plan format (Attached) is as per the model. | **<u>Y</u>** | | | |
| **10** | The model lesson plans (attached) depicts the theoretical rationale of paradigm | **<u>Y</u>** | | | |
| **11** | Lesson plans show appropriate blends of traditional and online resources | **<u>Y</u>** | | | Lessons can vary. The basic idea is clear. |

**THANKS**

**Appendix: E (iv)**

**Name of the Expert: Dr. Harjit Kaur, Professor, MGN College, GNDU Amritsar**
**Dated: June 2017**

**Kindly rate the parameters and give remarks.**

| S. No. | Parameters | Yes | No | Modification required | Remarks |
|---|---|---|---|---|---|
| 1 | Model is as per focus (Construction of knowledge, Development & use of appropriate blends, Preparing professional and humane teachers, Developing teaching effectiveness of student teachers, Improving academic achievement of learners) | Yes | | | Opportunities of knowledge construction given to students during lesson, use traditional and digital sources, mastery of content and learning as per the need of learner, strategies are planned by PT before hand, focused on student's maximum learning through experiences, |
| 2 | Designing of model in to focus, syntax, and social system, principle of reaction, support system and application is making it more comprehensive and accurate. | Yes | | | All essential aspects of instructional models incorporated here effectively to make the proposed model more meaningful and application orienented. |
| 3 | Operations of the Planning phase (attached) are appropriate | Yes | | | All points related to planning phase mentioned above have been incorporated in the lesson as per the need. |
| 4 | Operations of the Implementation phase (attached) are appropriate | Yes | | | Learning experiences of learners are organized well in lesson, learners did verify the knowledge through real and virtual experiences, PISA guidelines have been incorporated in the lesson by creating situations corresponding to enhancement of critical awareness among learners and it focuses more on reflective level learning. |
| 5 | Operations of the Evaluation phase (attached) are appropriate | Yes | | | The model lesson pointed towards the knowledge construction by the students, use of real and virtual experiences, use of traditional ways and digital application for evaluation, use of various strategies by PT |
| 6 | Model shows appropriate blends of traditional and online resources | Yes | | | Use of black/white board for making diagrams, worksheets and animated videos. |

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|---|---|---|---|---|---|
| 7 | Theoretical framework of model is appropriate to Indian schools. | Yes | | | Due considerations are given as per the needs and conditions of Indian schools. |
| 8 | Model is Constructivist Blended and situational | Yes | | | PT planned the lesson by using traditional and digital resources as per classroom situations and need of the learners |
| 9 | Lesson plan format (Attached) is as per the model. | Yes | | | Lesson plan covered each and every mentioned aspect of the model |
| 10 | The model lesson plans (attached) depicts the theoretical rationale of paradigm | Yes | | | All the mentioned aspects related to theoretical rationale of paradigm have been included by the investigator. |
| 11 | Lesson plans show appropriate blends of traditional and online resources | Yes | | | To perform various activities, Real experience such as filling of the worksheets and making of diagram is emphasized and use of online resources is also depicted by referring to animated videos |

**THANKS**

The above remarks have been framed as per discussions held in June, 2017.

Harjit Kaur

**Appendix: E (v)**

**Name of the Expert: Dr. Arun Kulshresth, Professor, DayalBaag Educational Institutions, Agra**

**Dated: June 2017**

| S. No. | Parameters | Yes | No | Modification required | Remarks |
|---|---|---|---|---|---|
| 1 | Model is as per focus (Construction of knowledge, Development & use of appropriate blends, Preparing professional and humane teachers, Developing teaching effectiveness of student teachers, Improving academic achievement of learners) | yes | | | The CBIP is designed well which focused on holistic development of the child. The theoretical base is quite comprehensive and incorporates all the aspects which supports construction of knowledge ; specially ZPD, scaffolding & socio and cultural theory. |
| 2 | Designing of model in to focus, syntax, and social system, principle of reaction, support system and application is making it more comprehensive and accurate. | Yes | | | All essential features / elements of an instructional model are incorporated in designing CBIP. Each element is explained well. Application aspect / element is very comprehensive, which enhanced its effectiveness & use as for pre & in-service teachers training. |
| 3 | Operations of the Planning phase (attached) are appropriate | Yes | | | lesson plan incorporates all the operations shown in the planning phase, which will be helpful in |

| | | | | | |
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| | | | | | knowledge construction. |
| 4 | Operations of the Implementation phase (attached) are appropriate | yes | | | Process oriented operations (7) are appropriate & learning experiences provided in lesson plan are systematic & organized well applying both traditional & virtual experiences which creates situations to increase critical awareness among children and focused on reflective level teaching - learning. |
| 5 | Operations of the Evaluation phase (attached) are appropriate | Yes | | | Evaluation phase is comprehensive & appropriate. Which consisted five reflective operations. The researcher has incorporates various strategies /techniques of evaluation focusing various aspects / elements of CBIP e.g. evaluation of objectives, deciding pedagogical strategies, developed blended strategies etc. which enables the child to enhance critical awareness & knowledge construction. |
| 6 | Model shows appropriate blends of traditional and online resources | Yes | | | The researcher has used appropriate strategies like: black / white board, animations & videos to explain the concepts. |
| 7 | Theoretical framework of model is appropriate to | Yes | | | The researcher has applied both traditional and online resources which fulfills the needs and conditions of |

| | | | | | |
|---|---|---|---|---|---|
| | Indian schools. | | | | Indian schools & will support students in knowledge construction. |
| 8 | Model is Constructivist Blended and situational | <u>Yes</u> | | | Model lesson is prepared using both traditional & online resources which is blend of constructivists & traditional approach and fulfills the needs of the children of Indian schools. |
| 9 | Lesson plan format (Attached) is as per the model. | <u>Yes</u> | | | Model lesson covered all the elements mentioned in the design of CBIP. |
| 10 | The model lesson plans (attached) depicts the theoretical rationale of paradigm | <u>Yes</u> | | | The investigator has incorporated all the theoretical aspects as per CBIP model description |
| 11 | Lesson plans show appropriate blends of traditional and online resources | <u>Yes</u> | | | The researcher has performed various teaching activities by creating problematic situations, formulating & justifying hypotheses and giving explanations to increase the critical awareness amongst students. The researcher has also applied both traditional & online / digital resources which focused the blending of both approaches / resources. |

**<u>THANKS</u>**

**Appendix:E (vi)**

**Name of the Expert: Prof. Kusum Sharma, JMI New Delhi**

**Dated: July 2017**

| S. No. | Parameters | Yes | No | Modify | Remarks |
|---|---|---|---|---|---|
| 1 | **Model is as per focus (**Construction of knowledge, Development & use of appropriate blends, Preparing professional and humane teachers, Developing teaching effectiveness of student teachers, Improving academic achievement of learners) | Yes | | | |
| 2 | Designing of model in to focus, syntax, and social system, principle of reaction, support system and application is making it more comprehensive and accurate. | Yes | | | Earlier suggestions incorporated. |
| 3 | Operations of the Planning phase (attached) are appropriate | Yes | | | |
| 4 | Operations of the Implementation phase (attached) are appropriate | Yes | | | |
| 5 | Operations of the Evaluation phase (attached) are appropriate | Yes | | | |
| 6 | Model shows appropriate blends of traditional and online resources | Yes | | | model blended strategies developed. |
| 7 | Theoretical framework of model is appropriate to Indian schools. | Yes | | | |
| 8 | Model is Constructivist Blended and situational | Yes | | | |
| 9 | Lesson plan format (Attached) is as per the model. | Yes | | | |

| | | | | | |
|---|---|---|---|---|---|
| **10** | The model lesson plans (attached) depicts the theoretical rationale of paradigm | Yes | | | |
| **11** | Lesson plans show appropriate blends of traditional and online resources | Yes | | | |

**<u>THANKS</u>**

**Appendix: E (vii)**

**Name of the Expert: Prof. Aruna Anand, Formar Head, Dept. of Edcuation, GNDU, Amritsar**

**Dated: June 2017**

| **S. No:** | **Parameters** | **Yes** | **No** | **Modification required** | **Remarks** |
|---|---|---|---|---|---|
| 1 | **Model is as per focus (**Construction of knowledge, Development & use of appropriate blends, Preparing professional and humane teachers, Developing teaching effectiveness of student teachers, Improving academic achievement of learners) | Yes | | | Traditional and digital opportunities are given while construction of knowledge in the lesson plan.Development of content and learning as need of the learner.Strategies are planned to give maximum learning experiences to learners. |
| 2 | Designing of model in to focus, syntax, and social system, principle of reaction, support system and application is making it more comprehensive and accurate. | Yes | | | Required aspects of instructional models are added making it more comprehensive and accurate but flexibility be given proper space as per need. |
| 3 | Operations of the Planning phase (attached) are appropriate | Yes | | | All points of planning phase as mentioned are incorporated as per the requirement. |
| 4 | Operations of the Implementation phase (attached) are appropriate | Yes | | | Requisite learning experiences of learners are organized in lesson plan.Learners are engaged in different activities.Justification, explanations and enhancement of critical awareness given(as per PISA guidelines) |
| 5 | Operations of the | Yes | | | Knowledge construction done in |

| | | | | | |
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| | Evaluation phase (attached) are appropriate | | | | the lesson plan for learners, use of traditional,real,virtual experiences along with digital applications.Learning outcomes as evaluation are more content oriented. |
| **6** | Model shows appropriate blends of traditional and online resources | Yes | | | Use of different boards,worksheets ,videos by PT. |
| **7** | Theoretical framework of model is appropriate to Indian schools. | Yes | | | Efforts are being made to make it more appropriate as per Indian school conditions. |
| **8** | Model is Constructivist Blended and situational | Yes | | | The lesson is planned by using traditional and ICT resources as per the need of the learners in the classroom. |
| **9** | Lesson plan format (Attached) is as per the model. | Yes | | | Lesson plan covered every aspect of the model |
| **10** | The model lesson plans (attached) depicts the theoretical rationale of paradigm | Yes | | | The investigator included all theoretical rationale of the paradigm. |
| **11** | Lesson plans show appropriate blends of traditional and online resources | Yes | | | Real experience such as making diagrams ,filling worksheets,use of ICT depicted in the lesson plan. |

**THANKS**

**Appendix: E (viii)**

**Name of the Expert: Dr. Monica Nagpal, Associate professor, CTE, New Delhi**
**Dated: June 2017**

| **S. No.** | **Parameters** | **Yes** | **No** | **Modify** | **Remarks** |
|---|---|---|---|---|---|
| **1** | **Model is as per focus (**Construction of knowledge, Development & use of appropriate blends, Preparing professional and humane teachers, Developing teaching effectiveness of student teachers, Improving academic achievement of learners) | Yes | | | The model emphasises on all the aspects. It allows teachers to be well versed with not only their content but also for accessing variety of resources, exploring other tools and faciliatating learning. |
| **2** | Designing of model in to focus, syntax, and social system, principle of reaction, support system and application is making it more comprehensive and accurate. | Yes | | | These all elements plays an imprtant role in teaching and learning and have been accurately mapped in the model. |
| **3** | Operations of the Planning phase (attached) are appropriate | Yes | | | Planning phase is one of the important phases and 9 detailed points are well organised and the practicality of planning stage is visible in the sample lesson plan. |
| **4** | Operations of the Implementation phase (attached) are appropriate | Yes | | | All the seven points are seen in the model lessson plan and awareness and use of |

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| | | | | | PISA guidelines also emphasizes on its usability. |
| **5** | Operations of the Evaluation phase (attached) are appropriate | Yes | | | A very integrated approach for evaluation is visible in the whole concept. |
| **6** | Model shows appropriate blends of traditional and online resources | Yes | | | Blend of tradtional and online is the need of the hour abut which India is talking from long time but this model gives a very realistic view of the implementation of the same |
| **7** | Theoretical framework of model is appropriate to Indian schools. | Yes | | | Indian schools are going to evolve at high speed and model like this are going to be helpful in the process. |
| **8** | Model is Constructivist Blended and situational | Yes | | | It shows all the three approaches |
| **9** | Lesson plan format (Attached) is as per the model. | Yes | | | Very well presents the Model |
| **10** | The model lesson plans (attached) depicts the theoretical rationale of paradigm | Yes | | | Model itself means it is going to show the practical aspect and it has very well been depicted. |
| **11** | Lesson plans show appropriate blends of traditional and online resources | Yes | | | LP is based on the model and depicts all aspects of the model. |

**THANKS**

**Appendix: E (ix)**

**Name of the Expert: Ms. Sarla Mishra, Principal, BSF Sen. Secondary School, Jalandhar**
**Dated: June 2018**

| **S. No.** | **Parameters** | **Yes** | **No** | **Modification required** | **Remarks** |
|---|---|---|---|---|---|
| 1 | **Model is as per focus** (Construction of knowledge, Development & use of appropriate blends, Preparing professional and humane teachers, Developing teaching effectiveness of student teachers, Improving academic achievement of learners) | Yes | | | Model is comprehensive, good for developing skilled teachers |
| 2 | Designing of model in to focus, syntax, and social system, principle of reaction, support system and application is making it more comprehensive and accurate. | Yes | | | |
| 3 | Operations of the Planning phase (attached) are appropriate | Yes | | | |
| 4 | Operations of the Implementation phase (attached) are appropriate | Yes | | | |
| 5 | Operations of the Evaluation phase (attached) are appropriate | Yes | | | |
| 6 | Model shows appropriate blends of traditional and online resources | Yes | | | Technology has been used. |
| 7 | Theoretical framework of model is appropriate to Indian schools. | Yes | | | |

| | | | | | |
|---|---|---|---|---|---|
| **8** | Model is Constructivist Blended and situational | Yes | | | All skills taken in to consideration. |
| **9** | Lesson plan format (Attached) is as per the model. | Yes | | | Lesson plans are activity based for higher level of learning. |
| **10** | The model lesson plans (attached) depicts the theoretical rationale of paradigm | Yes | | | Module formation is helpful for both teacher and student. |
| **11** | Lesson plans show appropriate blends of traditional and online resources | Yes | | | Use of dictionary and Wikipedia is interesting and motivating (English lesson). |

**THANKS**

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**Appendix: F**

**CVR of CBIP**

| S. No. | Parameters | Yes | No | Modify | CVR |
|---|---|---|---|---|---|
| **1** | **Model is as per focus (**Construction of knowledge, Development & use of appropriate blends, Preparing professional and humane teachers, Developing teaching effectiveness of student teachers, Improving academic achievement of learners) | 9 | | | 1 |
| **2** | Designing of model in to focus, syntax, and social system, principle of reaction, support system and application is making it more comprehensive and accurate. | 8 | 1 | | 0.777778 |
| **3** | Operations of the Planning phase (attached) are appropriate | 9 | | | 1 |
| **4** | Operations of the Implementation phase (attached) are appropriate | 9 | | | 1 |
| **5** | Operations of the Evaluation phase (attached) are appropriate | 9 | | | 1 |
| **6** | Model shows appropriate blends of traditional and online resources | 9 | | | 1 |
| **7** | Theoretical framework of model is appropriate to Indian schools. | 9 | | | 1 |
| **8** | Model is Constructivist Blended and situational | 9 | | | 1 |
| **9** | Lesson plan format (Attached) is as per the model. | 9 | | | 1 |
| **10** | The model lesson plans (attached) depicts the theoretical rationale of paradigm | 9 | | | 1 |
| **11** | Lesson plans show appropriate blends of traditional and online resources | 9 | | | 1 |

## Appendix G
## Content Validity Ratio of Teaching Effectiveness Scale

| S. No. | Statement | HR | RM | SR | NR | CVR |
|---|---|---|---|---|---|---|
| 1 | Formulates instructional objectives in specific behavioral outcomes. | 9 | | | | 1 |
| 2 | Develops objectives for all the three domains of development. | 9 | | | | 1 |
| 3 | **Arranged objectives logically.** | 6 | | | 3 | 0.333333 |
| 4 | Designs objectives as per need of students & subject. | 9 | | | | 1 |
| 5 | Selects both traditional & on-line resources/aids. | 9 | | | | 1 |
| 6 | **Mentioned teaching/supporting aids specifically.** | 6 | | | 3 | 0.333333 |
| 7 | Plans open ended questions to motivate students & facilitates discussions | 8 | | 1 | | 0.777778 |
| 8 | Plans teaching and learning experiences as per level of students. | 7 | 2 | | | 1 |
| 9 | Uses blends of traditional & on line learning resources in lesson development. | 8 | | 1 | | 0.777778 |
| 10 | Developed simple & systematic lesson plan. | 8 | | 1 | | 0.777778 |
| 11 | Designs variety of creative assignments to assess learning in students. | 8 | | 1 | | 0.777778 |
| 12 | **Establishes rapport by observing the whole class.** | 7 | | | | 0.555556 |
| 13 | Establish the climate of open mindedness & mutual trust. | 8 | | 1 | | 0.777778 |
| 14 | Assesses the previous knowledge of students through activities. | 9 | | | | 1 |
| 15 | Fills the knowledge gaps between previous knowledge and assumed knowledge of students. | 8 | | 1 | | 0.777778 |
| 16 | Creates challenging learning situations in the classroom. | 8 | | 1 | | 0.777778 |
| 17 | Involves students in activities that encourage them to explore possible solutions. | 8 | 1 | | | 1 |
| 18 | Accepts or rejects students' ideas through discussions. | 6 | 2 | 1 | | 0.777778 |
| 19 | Introduces the topic to students effectively. | 8 | | 1 | | 0.777778 |
| 20 | Creates appropriate need for learning the present content among learners. | 9 | | | | 1 |
| 21 | Encourages students to write their explorations on the board/copy. | 9 | | | | 1 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 22 | **Provides individualized programs, support and instructions for students with specific needs.** | 7 | | | | 0.555556 |
| 23 | Ensures neatness & correctness in the board work. | 8 | | | 1 | 0.777778 |
| 24 | **uses variety of instructional and ICT resources to enrich students' learning experiences** | 5 | | | | 0.111111 |
| 25 | Adjust the pace of lesson to the level of students. | 8 | | 1 | | 0.777778 |
| 26 | Encourages students to develop their own explanations. | 8 | | 1 | | 0.777778 |
| 27 | Encourages students to ask questions. | 8 | | 1 | | 0.777778 |
| 28 | Handles students' queries effectively. | 8 | | | 1 | 0.777778 |
| 29 | Encourages students to apply and extend the learned concepts in new situations. | 7 | 2 | 1 | | 0.777778 |
| 30 | Creates situations that encourage students to assume responsibility. | 9 | | | | 1 |
| 31 | Gives appropriate reinforcement to students. | 9 | | | | 1 |
| 32 | Uses both traditional face-to- face and on–line learning resources. | 9 | | | | 1 |
| 33 | Uses variety of instructional & ICT resources to enrich students' learning experiences. | 9 | | | | 1 |
| 34 | **Uses on-line resources (like online quiz, blogs etc.) in assessment.** | 4 | | 2 | 3 | -0.11111 |
| 35 | Creates blend of resources suitable to context, content and learner. | 7 | 2 | | | 1 |
| 36 | Handles synchronous teaching learning resources ( ) effectively. | 9 | | | | 1 |
| 37 | Encourages students to use their personal devices in learning. | 6 | 3 | | | 1 |
| 38 | Uses asynchronous teaching learning resources appropriately. | 6 | 3 | | | 1 |
| 39 | Involves students in organization of teaching learning resources. | 9 | | | | 1 |
| 40 | Promotes students' participation in live discussions (video conferencing/chats etc.). | 8 | | 1 | | 0.777778 |
| 41 | Encourages students to share their views on on-line forums (Blogs, Wikis etc.). | 8 | | | 1 | 0.777778 |
| 42 | Encourages students to share their real life experiences to promote discussions. | 8 | | 1 | | 0.777778 |
| 43 | Poses analytical questions to promote critical thinking skills. | 9 | | | | 1 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 44 | Shows pleasing and apt gestures. | 9 | | | | 1 |
| 45 | Shows proper coordination between verbal & nonverbal behavior. | 8 | | 1 | | 0.777778 |
| 46 | Adopts current practices into teaching and learning process. | 8 | | 1 | | 0.777778 |
| 47 | Shows passion for teaching. | 9 | | | | 1 |
| 48 | Encourages students to study at level higher to their present level. | 7 | 1 | 1 | | 0.777778 |
| 49 | Promotes development of individual value system. | 8 | | | 1 | 0.777778 |
| 50 | Uses civilized language with the students. | 8 | | | 1 | 0.777778 |
| 51 | Readily accepts accountability for mistakes committed. | 8 | | | 1 | 0.777778 |
| 52 | **provides opportunities for students to use ICT to support inquiry, advance communication and expression of ideas** | 4 | | 1 | 4 | -0.11111 |
| 53 | **provides opportunities for students to develop reflective decision-making skills in teaching learning process** | 7 | | 2 | | 0.555556 |
| 54 | **encourages constructive dialogue with parents and guardians about student progress and achievement** | 6 | | | 3 | 0.333333 |
| 55 | **engages self in constructive dialogue with colleagues relating to professional issues.** | 6 | | | 3 | 0.333333 |
| 56 | **attributes pedagogical failure to low effort or an ineffective strategy** | 7 | | | 2 | 0.555556 |
| 57 | **forms partnerships with teaching and non-teaching staff to support student learning.** | 3 | | 2 | 4 | -0.33333 |
| 58 | **interacts effectively with parents or guardians to clarify their concerns and issues** | 6 | | | 3 | 0.333333 |
| 59 | **engages students in productive collaboration with each other and with other members outside the school** | 3 | | | | -0.33333 |
| 60 | **accepts personal accountability toward society and work to build a better world.** | 6 | | 2 | 1 | 0.333333 |
| 61 | Uses activities to promote cooperation & collaboration among students. | 8 | | 1 | | 0.777778 |
| 62 | Uses real life, practical learning experinees to motivate & engage students. | 8 | | 1 | | 0.777778 |
| 63 | Maintains a climate of participation in the classroom. | 8 | | 1 | | 0.777778 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 64 | Discusses case studies/projects as strategies to sensitize students about community. | 9 | | | | 1 |
| 65 | Encourage students to work on real problems from the society. | 9 | | | | 1 |
| 66 | **designs learning activities appropriate to subject matter and occasionally bring subject experts into the classroom** | 6 | | | 3 | 0.333333 |
| 67 | Gives freedom to students to work at their own. | 9 | | | | 1 |
| 68 | Gives clear and precise instructions | 9 | | | | 1 |
| 69 | Communicates effectively with every student. | 8 | | 1 | | 0.777778 |
| 70 | Distributes relevant reading material to students. | 9 | | | | 1 |
| 71 | Enters the class on time & leave it on time. | 8 | | | 1 | 0.777778 |
| 72 | Involves students in setting classroom procedures. | 9 | | | | 1 |
| 73 | Shows concern with every student in the class. | 9 | | | | 1 |
| 74 | Sets examples of appropriate behavior in the classroom. | 9 | | | | 1 |
| 75 | Achieves objectives by managing classroom time effectively. | 8 | | 1 | | 0.777778 |
| 76 | Does not shout at students. | 9 | | | | 1 |
| 77 | Handles students' disruptive behavior appropriately. | 9 | | | | 1 |
| 78 | **Manages classroom time effectively.** | 5 | | | 4 | 0.111111 |
| 79 | **uses knowledge of curriculum content and resources in designing learning experiences** | 7 | | | 2 | 0.555556 |
| 80 | **Encourages and apply understanding of NCF to curriculum and policy planning.** | 5 | | | 4 | 0.111111 |
| 81 | **Ensures that the curriculum and policies are inclusive to the needs of all students.** | 3 | | 1 | 5 | -0.33333 |
| 82 | **ensures effective implementation of curriculum and policies in classroom practices** | 3 | | 2 | 4 | -0.33333 |
| 83 | obeys rules and regulations that relate to the work of teachers | 8 | | 1 | | 0.777778 |
| 84 | Informs evaluation criteria clearly in the beginning of instruction. | 9 | | | | 1 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 85 | **Plans and conduct monitoring and assessment activities in accordance with school and national policies.** | 6 | | | 3 | 0.333333 |
| 86 | Summarizes the lesson appropriately. | 9 | | | | 1 |
| 87 | Evaluates students as per framed objectives. | 9 | | | | 1 |
| 88 | Encourages students to evaluate their own work. | 8 | | 1 | | 0.777778 |
| 89 | Employs various formative assessment practices. | 8 | | 1 | | 0.777778 |
| 90 | Diagnoses students' learning difficulties. | 9 | | | | 1 |
| 91 | Adopts remedial measures suitable to the level of student. | 6 | 2 | 1 | | 0.777778 |
| 92 | **gives due emphasis to both intended and unintended outcomes of curriculum and policy implementation** | 5 | | 1 | 3 | 0.111111 |
| 93 | Employs rubrics to evaluate the performance of students. | 9 | | | | 1 |
| 94 | Gives homework adequate to the level of students. | 9 | | | | 1 |
| 95 | Gives creative assignments in home work. | 9 | | | | 1 |

## Appendix H

## Item Evaluation (p-values)

| S .No. | Statement | p-value |
|---|---|---|
| 1 | Formulates instructional objectives in specific behavioral outcomes. | .000 |
| 2 | Develops objectives for all the three domains of development. | .000 |
| 3 | Designs objectives as per need of students & subject. | .000 |
| 4 | Selects both traditional & on-line resources/aids. | .000 |
| 5 | Plans open ended questions to motivate students & facilitate discussions. | .000 |
| 6 | Plans relevant educational activities as per level of students. | .000 |
| 7 | Uses blends of traditional & on line learning resources in lesson development. | .000 |
| 8 | Designs variety of creative assignments to assess learning in students. | .000 |
| 9 | Establish the climate of open-mindedness & mutual trust. | .000 |
| 10 | Assesses the previous knowledge of students through activities. | .000 |
| 11 | Fills the knowledge gaps between previous knowledge and assumed knowledge of students. | .000 |
| 12 | Uses real life, practical learning experiences to motivate & engage students. | .000 |
| 13 | Involves students in problem-solving activities that encourages them to explore possible solutions. | .000 |
| 14 | Accepts or rejects students' ideas through democratic discussions. | .000 |
| 15 | Creates appropriate need for learning the present content among learners. | .000 |
| 16 | Informs students about the expected outcomes from the lesson. | .000 |
| 17 | Encourages students to write their explorations on the board/copy. | .000 |
| 18 | Ensures neatness & correctness in the board work. | .000 |
| 19 | Adjust the pace of lesson to the level of students. | .000 |
| 20 | Uses activities to promote cooperation & collaboration among students. | .000 |
| 21 | Encourages students to develop their own explanations. | .000 |
| 22 | Encourages students to ask questions. | .000 |
| 23 | Handles students' queries effectively. | .000 |
| 24 | Encourages students to apply and extend the learned concepts and skills in new situations. | .000 |

| | | |
|---|---|---|
| 25 | Creates situations that encourage students to assume responsibility. | .000 |
| 26 | Gives appropriate reinforcement to students. | .000 |
| 27 | Uses both traditional face-to- face and on–line learning resources. | .000 |
| 28 | Uses variety of instructional & ICT resources to enrich students' learning experiences. | .000 |
| 29 | Creates appropriate blend of resources suitable to context, content and learner. | .000 |
| 30 | Handles synchronous teaching learning resources ( ) effectively. | .000 |
| 31 | Encourages students to use their personal devices (cell phone, mp3 player, Audio) in learning. | .000 |
| 32 | Uses asynchronous teaching learning resources (e-mail, Wikis, Facebook etc.) appropriately. | .000 |
| 33 | Involves students in organization of teaching learning resources. | .000 |
| 34 | Promotes students' participation in live discussions (video conferencing/chats etc.). | .000 |
| 35 | Encourages students to share their views on on-line forums (Blogs, Wikis etc.). | .000 |
| 36 | Encourages students to share their real life experiences to promote discussions. | .000 |
| 37 | Poses analytical questions to promote critical thinking skills. | .000 |
| 38 | Shows pleasing and apt gestures. | .000 |
| 39 | Shows proper coordination between verbal & nonverbal behavior. | .000 |
| 40 | Adopts current practices into teaching and learning process. | .000 |
| 41 | Shows passion for teaching. | .000 |
| 42 | Encourages students to perform at level higher to their present level. | .000 |
| 43 | Promotes development of individual value system. | .000 |
| 44 | Uses civilized language with the students. | .000 |
| 45 | Readily accepts accountability for mistakes committed. | .000 |
| 46 | Maintains a climate of participation in the classroom. | .000 |
| 47 | Discusses case studies/projects as strategies to sensitize students about community.mm | .000 |
| 48 | Encourage students to work on real problems from the society. | .000 |
| 49 | Gives freedom to students to work at their own. | .000 |
| 50 | Gives clear and precise instructions | .000 |
| 51 | Communicates effectively with every student. | .000 |

| | | |
|---|---|---|
| 52 | Distributes relevant reading material to students. | .000 |
| 53 | Enters the class on time & leave it on time. | .000 |
| 54 | Involves students in setting classroom procedures. | .000 |
| 55 | Shows concern with every student in the class. | .000 |
| 56 | Sets examples of appropriate behavior in the classroom. | .000 |
| 57 | Achieves objectives by managing classroom time effectively. | .000 |
| 58 | Does not shout at students. | .000 |
| 59 | Handles students' disruptive behavior appropriately. | .000 |
| 60 | Informs evaluation criteria clearly in the beginning of instruction. | .000 |
| 61 | Summarizes the lesson appropriately. | .000 |
| 62 | Evaluates students as per framed objectives. | .000 |
| 63 | Encourages students to evaluate their own work. | .000 |
| 64 | Employs various formative assessment practices. | .000 |
| 65 | Diagnoses students' learning difficulties. | .000 |
| 66 | Adopts remedial measures suitable to the learning difficulty and level of student. | .000 |
| 67 | Uses on-line resources (like online quiz, blogs etc.) in assessment. | .000 |
| 68 | Employs rubrics to evaluate the performance of students. | .000 |
| 69 | Gives homework adequate to the level of students. | .000 |
| 70 | Gives creative assignments in home work. | .000 |

**Appendix I**

**Exploratory Factor Analysis of TES Scale**

| S. No. | Factor | Variance (%) | Statement | Loading |
|---|---|---|---|---|
| 1. | **Lesson Planning Competence (LPC)** | | Formulates instructional objectives in specific behavioral outcomes. | .657 |
| | | | Develops objectives for all the three domains of development. | .675 |
| | | | Designs objectives as per need of students & subject. | .673 |
| | | | Selects both traditional & on-line resources/aids. | .637 |
| | | | Plans open ended questions to motivate students & facilitate discussions. | .676 |
| | | | Plans relevant educational activities as per level of students. | .581 |
| | | | Uses blends of traditional & on line learning resources in lesson development. | .675 |
| | | | Designs variety of creative assignments to assess learning in students. | .699 |
| 2. | **Knowledge Construction & Facilitation Competence (KCFC)** | | Establishes the climate of open-mindedness & mutual trust. | .417 |
| | | | Assesses the previous knowledge of students through activities. | .477 |
| | | | Fills the knowledge gaps between previous knowledge and assumed knowledge of students. | .487 |
| | | | Uses real life, practical learning experiences to motivate & engage students. | .501 |
| | | | Involves students in problem-solving activities that encourage them to explore possible solutions. | .556 |
| | | | Accepts or rejects students' ideas through democratic discussions. | .609 |
| | | | Creates appropriate need for learning the present content among learners. | .596 |
| | | | Informs students about the expected outcomes from the lesson. | .512 |
| | | | Encourages students to write their explorations on the board/copy. | .526 |
| | | | Ensures neatness & correctness in the board work. | .634 |
| | | | Adjust the pace of lesson to the level of students. | .620 |

| | | | | |
|---|---|---|---|---|
| | | | Uses activities to promote cooperation & collaboration among students. | .635 |
| | | | Encourages students to develop their own explanations. | .584 |
| | | | Encourages students to ask questions. | .655 |
| | | | Handles students' queries effectively. | .590 |
| | | | Encourages students to apply and extend the learned concepts and skills in new situations. | .640 |
| | | | Creates situations that encourage students to assume responsibility. | .467 |
| | | | Gives appropriate reinforcement to students. | .558 |
| | | | Encourages students to share their real life experiences to promote discussions. | 0.528 |
| | | | Poses analytical questions to promote critical thinking skills. | 0.543 |
| | | | Shows pleasing and apt gestures. | 0.545 |
| | | | Shows proper coordination between verbal & nonverbal behavior. | 0.422 |
| | | | Uses civilized language with the students. | 0.42 |
| | | | Gives clear and precise instructions | 0.441 |
| 3. | **Technology Competence (TC)** | | Uses both traditional face-to- face and on–line learning resources. | .736 |
| | | | Uses variety of instructional & ICT resources to enrich students' learning experiences. | .668 |
| | | | Creates appropriate blend of resources suitable to context, content and learner. | .646 |
| | | | Handles synchronous teaching learning resources ( ) effectively. | .676 |
| | | | Encourages students to use their personal devices (cell phone, mp3 player, Audio) in learning. | .765 |
| | | | Uses asynchronous teaching learning resources (e-mail, Wikis, Facebook etc.) appropriately. | .529 |
| | | | Involves students in organization of teaching learning resources. | .402 |
| 4. | **Professional Competence (PC)** | | Promotes development of individual value system. | .484 |
| | | | Readily accepts accountability for mistakes committed. | .504 |
| | | | Discusses case studies/projects as strategies to sensitize students about community. | .550 |

| | | | | |
|---|---|---|---|---|
| | | | Encourages students to work on real problems from the society. | .571 |
| | | | Gives freedom to students to work at their own. | .592 |
| | | | Distributes relevant reading material to students. | .559 |
| | | | Involves students in setting classroom procedures. | .530 |
| | | | Shows concern with every student in the class. | .510 |
| | | | Sets examples of appropriate behavior in the classroom. | .475 |
| | | | Does not shout at students. | .485 |
| | | | Handles students' disruptive behavior appropriately. | .495 |
| | | | Informs evaluation criteria clearly in the beginning of instruction. | .522 |
| 5. | **Evaluation Competence (EC)** | | Summarizes the lesson appropriately. | .541 |
| | | | Evaluates students as per framed objectives. | .675 |
| | | | Encourages students to evaluate their own work. | .518 |
| | | | Employs various formative assessment practices. | .599 |
| | | | Diagnoses students' learning difficulties. | .555 |
| | | | Adopts remedial measures suitable to the learning difficulty and level of student. | .616 |
| | | | Uses on-line resources (like online quiz, blogs etc.) in assessment. | .732 |
| | | | Employs rubrics to evaluate the performance of students. | .748 |
| | | | Gives homework adequate to the level of students. | .561 |
| | | | Gives creative assignments in home work. | .537 |

## Appendix J

**TEACHING EFFECTIVENESS SCALE (for student teachers)**

**Fill the following information:**

Name of prospective teacher/teacher: ________________________________ Gender: ______________ Age: ______________________ Previous qualification: ____________________________________

Pedagogy subject: _______________________ Topic: _________________________________

Class: ______________ Name of school: ________________________________________________

Type of School: ________________________________________ Date: ________________________

**Instructions:**

- The statements ranging from 1-8 are concerning with lesson planning. The observer should rate these statements by observing relevant lesson plan.
- The statements ranging from 9-61 should be observed in real situation while the prospective teacher/teacher is delivering the lesson plan.
- Tick (√) the appropriate rating as per your observation. (Abbreviations: VP-Very Poor, P-Poor, BA-Below Average, A-Average, G-Good, VG-Very Good, E-Excellent).

**Give appropriate rating to all statements.**

| **S. No.** | **Statement** | **VP** | **P** | **BA** | **A** | **G** | **VG** | **E** |
|---|---|---|---|---|---|---|---|---|
| **The prospective teacher** | | | | | | | | |
| 1 | Formulates instructional objectives in specific behavioral outcomes. | | | | | | | |
| 2 | Develops objectives for all the three domains of development. | | | | | | | |
| 3 | Designs objectives as per need of students & subject. | | | | | | | |
| 4 | Selects both traditional & on-line resources/aids. | | | | | | | |
| 5 | Plans open ended questions to motivate students & facilitate discussions. | | | | | | | |
| 6 | Plans relevant educational activities as per level of students. | | | | | | | |
| 7 | Uses blends of traditional & on line learning resources in lesson development. | | | | | | | |
| 8 | Designs variety of creative assignments to assess learning in students. | | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 9 | Establish the climate of open mindedness & mutual trust. | | | | | | | |
| 10 | Assesses the previous knowledge of students through activities. | | | | | | | |
| 11 | Fills the knowledge gaps between previous knowledge and assumed knowledge of students. | | | | | | | |
| 12 | Uses real life, practical learning experiences to motivate & engage students. | | | | | | | |
| 13 | Involves students in problem-solving activities that encourage them to explore possible solutions. | | | | | | | |
| 14 | Accepts or rejects students' ideas through democratic discussions. | | | | | | | |
| 15 | Creates appropriate need for learning the present content among learners. | | | | | | | |
| 16 | Informs students about the expected outcomes from the lesson. | | | | | | | |
| 17 | Encourages students to write their explorations on the board/copy. | | | | | | | |
| 18 | Ensures neatness & correctness in the board work. | | | | | | | |
| 19 | Adjust the pace of lesson to the level of students. | | | | | | | |
| 20 | Uses activities to promote cooperation & collaboration among students. | | | | | | | |
| 21 | Encourages students to develop their own explanations. | | | | | | | |
| 22 | Encourages students to ask questions. | | | | | | | |
| 23 | Handles students' queries effectively. | | | | | | | |
| 24 | Encourages students to apply and extend the learned concepts and skills in new situations. | | | | | | | |
| 25 | Creates situations that encourage students to assume responsibility. | | | | | | | |
| 26 | Gives appropriate reinforcement to students. | | | | | | | |
| 27 | Encourages students to share their real life experiences to promote discussions. | | | | | | | |
| 28 | Poses analytical questions to promote critical thinking skills. | | | | | | | |
| 29 | Shows pleasing and apt gestures. | | | | | | | |
| 30 | Shows proper coordination between verbal & nonverbal behavior. | | | | | | | |
| 31 | Uses civilized language with the students. | | | | | | | |
| 32 | Gives clear and precise instructions | | | | | | | |
| 33 | Uses both traditional face-to- face and on–line learning resources. | | | | | | | |
| 34 | Uses variety of instructional & ICT resources to enrich students' learning experiences. | | | | | | | |
| 35 | Creates appropriate blend of resources suitable to context, content and learner. | | | | | | | |
| 36 | Handles synchronous teaching learning resources ( ) effectively. | | | | | | | |
| 37 | Encourages students to use their personal devices (cell phone, mp3 player, Audio) in learning. | | | | | | | |
| 38 | Uses asynchronous teaching learning resources (e-mail, Wikis, Facebook etc.) appropriately. | | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 39 | Involves students in organization of teaching learning resources. | | | | | | | |
| 40 | Promotes development of individual value system. | | | | | | | |
| 41 | Readily accepts accountability for mistakes committed. | | | | | | | |
| 42 | Discusses case studies/projects as strategies to sensitize students about community.mm | | | | | | | |
| 43 | Encourage students to work on real problems from the society. | | | | | | | |
| 44 | Gives freedom to students to work at their own. | | | | | | | |
| 45 | Distributes relevant reading material to students. | | | | | | | |
| 46 | Involves students in setting classroom procedures. | | | | | | | |
| 47 | Shows concern with every student in the class. | | | | | | | |
| 48 | Sets examples of appropriate behavior in the classroom. | | | | | | | |
| 49 | Does not shout at students. | | | | | | | |
| 50 | Handles students' disruptive behavior appropriately. | | | | | | | |
| 51 | Informs evaluation criteria clearly in the beginning of instruction. | | | | | | | |
| 52 | Summarizes the lesson appropriately. | | | | | | | |
| 53 | Evaluates students as per framed objectives. | | | | | | | |
| 54 | Encourages students to evaluate their own work. | | | | | | | |
| 55 | Employs various formative assessment practices. | | | | | | | |
| 56 | Diagnoses students' learning difficulties. | | | | | | | |
| 57 | Adopts remedial measures suitable to the learning difficulty and level of student. | | | | | | | |
| 58 | Uses on-line resources (like online quiz, blogs etc.) in assessment. | | | | | | | |
| 59 | Employs rubrics to evaluate the performance of students. | | | | | | | |
| 60 | Gives homework adequate to the level of students. | | | | | | | |
| 61 | Gives creative assignments in home work. | | | | | | | |

**Appendix K**
**Z-score Norms for TES Scale**

| Raw Score | Z-Score | Raw Score | Z-Score | Raw Score | Z-Score | Raw Score | Z-Score | Raw Score | Z-Score |
|---|---|---|---|---|---|---|---|---|---|
| 224 | -1.20 | 253 | -0.64 | 240 | -0.89 | 302 | 0.29 | 366 | 1.51 |
| 271 | -0.30 | 292 | 0.10 | 261 | -0.49 | 328 | 0.79 | 379 | 1.76 |
| 308 | 0.41 | 311 | 0.46 | 244 | -0.82 | 335 | 0.92 | 257 | -0.57 |
| 310 | 0.44 | 335 | 0.92 | 277 | -0.19 | 258 | -0.55 | 312 | 0.48 |
| 321 | 0.65 | 370 | 1.59 | 282 | -0.09 | 211 | -1.45 | 349 | 1.19 |
| 335 | 0.92 | 245 | -0.80 | 268 | -0.36 | 228 | -1.12 | 379 | 1.76 |
| 266 | -0.40 | 251 | -0.68 | 298 | 0.21 | 318 | 0.60 | 380 | 1.78 |
| 268 | -0.36 | 270 | -0.32 | 307 | 0.39 | 282 | -0.09 | 258 | -0.55 |
| 307 | 0.39 | 306 | 0.37 | 317 | 0.58 | 349 | 1.19 | 201 | -1.64 |
| 334 | 0.90 | 326 | 0.75 | 296 | 0.18 | 141 | -2.78 | 243 | -0.84 |
| 367 | 1.53 | 362 | 1.44 | 281 | -0.11 | 235 | -0.99 | 310 | 0.44 |
| 355 | 1.30 | 290 | 0.06 | 298 | 0.21 | 249 | -0.72 | 353 | 1.26 |
| 202 | -1.62 | 264 | -0.43 | 329 | 0.81 | 249 | -0.72 | 374 | 1.67 |
| 187 | -1.91 | 297 | 0.20 | 355 | 1.30 | 323 | 0.69 | 296 | 0.18 |
| 245 | -0.80 | 313 | 0.50 | 349 | 1.19 | 367 | 1.53 | 291 | 0.08 |
| 293 | 0.12 | 360 | 1.40 | 354 | 1.28 | 257 | -0.57 | 320 | 0.63 |
| 287 | 0.00 | 367 | 1.53 | 267 | -0.38 | 201 | -1.64 | 320 | 0.63 |
| 318 | 0.60 | 190 | -1.85 | 239 | -0.91 | 229 | -1.10 | 384 | 1.86 |
| 201 | -1.64 | 191 | -1.83 | 296 | 0.18 | 265 | -0.42 | 371 | 1.61 |
| 188 | -1.89 | 236 | -0.97 | 316 | 0.56 | 297 | 0.20 | 248 | -0.74 |
| 210 | -1.47 | 285 | -0.03 | 350 | 1.21 | 252 | -0.66 | 248 | -0.74 |
| 240 | -0.89 | 297 | 0.20 | 349 | 1.19 | 244 | -0.82 | 316 | 0.56 |
| 279 | -0.15 | 315 | 0.54 | 299 | 0.23 | 229 | -1.10 | 333 | 0.88 |
| 300 | 0.25 | 234 | -1.01 | 288 | 0.02 | 228 | -1.12 | 348 | 1.17 |
| 170 | -2.23 | 213 | -1.41 | 328 | 0.79 | 290 | 0.06 | 352 | 1.25 |
| 147 | -2.67 | 259 | -0.53 | 350 | 1.21 | 310 | 0.44 | 305 | 0.35 |
| 217 | -1.33 | 253 | -0.64 | 366 | 1.51 | 343 | 1.07 | 316 | 0.56 |
| 273 | -0.26 | 288 | 0.02 | 384 | 1.86 | 263 | -0.45 | 375 | 1.68 |
| 297 | 0.20 | 314 | 0.52 | 245 | -0.80 | 258 | -0.55 | 371 | 1.61 |
| 342 | 1.05 | 215 | -1.37 | 279 | -0.15 | 273 | -0.26 | 383 | 1.84 |
| 277 | -0.19 | 177 | -2.10 | 310 | 0.44 | 303 | 0.31 | 362 | 1.44 |
| 218 | -1.31 | 216 | -1.35 | 298 | 0.21 | 297 | 0.20 | 282 | -0.09 |
| 276 | -0.21 | 255 | -0.61 | 352 | 1.25 | 331 | 0.84 | 268 | -0.36 |
| 323 | 0.69 | 292 | 0.10 | 318 | 0.60 | 242 | -0.85 | 309 | 0.42 |
| 368 | 1.55 | 298 | 0.21 | 190 | -1.85 | 236 | -0.97 | 334 | 0.90 |
| 366 | 1.51 | 193 | -1.79 | 165 | -2.33 | 235 | -0.99 | 309 | 0.42 |
| 212 | -1.43 | 284 | -0.05 | 215 | -1.37 | 256 | -0.59 | 327 | 0.77 |
| 235 | -0.99 | 295 | 0.16 | 279 | -0.15 | 253 | -0.64 | 273 | -0.26 |
| 260 | -0.51 | 331 | 0.84 | 296 | 0.18 | 246 | -0.78 | 246 | -0.78 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 302 | 0.29 | 306 | 0.37 | 289 | 0.04 | 285 | -0.03 | 282 | -0.09 |
| 344 | 1.09 | 308 | 0.41 | 193 | -1.79 | 232 | -1.05 | 326 | 0.75 |
| 366 | 1.51 | 242 | -0.85 | 202 | -1.62 | 280 | -0.13 | 314 | 0.52 |
| 294 | 0.14 | 264 | -0.43 | 249 | -0.72 | 326 | 0.75 | 350 | 1.21 |
| 288 | 0.02 | 235 | -0.99 | 295 | 0.16 | 279 | -0.15 | 253 | -0.64 |
| 251 | -0.68 | 260 | -0.51 | 331 | 0.84 | 296 | 0.18 | 246 | -0.78 |
| 287 | 0.00 | 302 | 0.29 | 306 | 0.37 | 289 | 0.04 | 285 | -0.03 |
| 295 | 0.16 | 344 | 1.09 | 308 | 0.41 | 193 | -1.79 | 232 | -1.05 |
| 272 | -0.28 | 366 | 1.51 | 242 | -0.85 | 202 | -1.62 | 280 | -0.13 |
| 286 | -0.01 | 294 | 0.14 | 264 | -0.43 | 249 | -0.72 | 326 | 0.75 |
| 224 | -1.20 | 253 | -0.64 | 240 | -0.89 | 302 | 0.29 | 366 | 1.51 |
| 271 | -0.30 | 292 | 0.10 | 261 | -0.49 | 328 | 0.79 | 379 | 1.76 |
| 308 | 0.41 | 311 | 0.46 | 244 | -0.82 | 335 | 0.92 | 257 | -0.57 |
| 310 | 0.44 | 335 | 0.92 | 277 | -0.19 | 258 | -0.55 | 312 | 0.48 |
| 321 | 0.65 | 370 | 1.59 | 282 | -0.09 | 211 | -1.45 | 349 | 1.19 |
| 335 | 0.92 | 245 | -0.80 | 268 | -0.36 | 228 | -1.12 | 379 | 1.76 |
| 266 | -0.40 | 251 | -0.68 | 298 | 0.21 | 318 | 0.60 | 380 | 1.78 |
| 268 | -0.36 | 270 | -0.32 | 307 | 0.39 | 282 | -0.09 | 258 | -0.55 |
| 307 | 0.39 | 306 | 0.37 | 317 | 0.58 | 349 | 1.19 | 201 | -1.64 |
| 334 | 0.90 | 326 | 0.75 | 296 | 0.18 | 141 | -2.78 | 243 | -0.84 |
| 367 | 1.53 | 362 | 1.44 | 281 | -0.11 | 235 | -0.99 | 310 | 0.44 |
| 355 | 1.30 | 290 | 0.06 | 298 | 0.21 | 249 | -0.72 | 353 | 1.26 |
| 202 | -1.62 | 264 | -0.43 | 329 | 0.81 | 249 | -0.72 | 374 | 1.67 |
| 187 | -1.91 | 297 | 0.20 | 355 | 1.30 | 323 | 0.69 | 296 | 0.18 |
| 245 | -0.80 | 313 | 0.50 | 349 | 1.19 | 367 | 1.53 | 291 | 0.08 |
| 293 | 0.12 | 360 | 1.40 | 354 | 1.28 | 257 | -0.57 | 320 | 0.63 |
| 287 | 0.00 | 367 | 1.53 | 267 | -0.38 | 201 | -1.64 | 320 | 0.63 |
| 318 | 0.60 | 190 | -1.85 | 239 | -0.91 | 229 | -1.10 | 384 | 1.86 |
| 201 | -1.64 | 191 | -1.83 | 296 | 0.18 | 265 | -0.42 | 371 | 1.61 |
| 188 | -1.89 | 236 | -0.97 | 316 | 0.56 | 297 | 0.20 | 248 | -0.74 |
| 210 | -1.47 | 285 | -0.03 | 350 | 1.21 | 252 | -0.66 | 248 | -0.74 |
| 240 | -0.89 | 297 | 0.20 | 349 | 1.19 | 244 | -0.82 | 316 | 0.56 |
| 279 | -0.15 | 315 | 0.54 | 299 | 0.23 | 229 | -1.10 | 333 | 0.88 |
| 300 | 0.25 | 234 | -1.01 | 288 | 0.02 | 228 | -1.12 | 348 | 1.17 |
| 170 | -2.23 | 213 | -1.41 | 328 | 0.79 | 290 | 0.06 | 352 | 1.25 |
| 147 | -2.67 | 259 | -0.53 | 350 | 1.21 | 310 | 0.44 | 305 | 0.35 |
| 217 | -1.33 | 253 | -0.64 | 366 | 1.51 | 343 | 1.07 | 316 | 0.56 |
| 273 | -0.26 | 288 | 0.02 | 384 | 1.86 | 263 | -0.45 | 375 | 1.68 |
| 297 | 0.20 | 314 | 0.52 | 245 | -0.80 | 258 | -0.55 | 371 | 1.61 |
| 342 | 1.05 | 215 | -1.37 | 279 | -0.15 | 273 | -0.26 | 383 | 1.84 |
| 277 | -0.19 | 177 | -2.10 | 310 | 0.44 | 303 | 0.31 | 362 | 1.44 |
| 218 | -1.31 | 216 | -1.35 | 298 | 0.21 | 297 | 0.20 | 282 | -0.09 |
| 276 | -0.21 | 255 | -0.61 | 352 | 1.25 | 331 | 0.84 | 268 | -0.36 |
| 323 | 0.69 | 292 | 0.10 | 318 | 0.60 | 242 | -0.85 | 309 | 0.42 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 368 | 1.55 | 298 | 0.21 | 190 | -1.85 | 236 | -0.97 | 334 | 0.90 |
| 366 | 1.51 | 193 | -1.79 | 165 | -2.33 | 235 | -0.99 | 309 | 0.42 |
| 212 | -1.43 | 284 | -0.05 | 215 | -1.37 | 256 | -0.59 | 327 | 0.77 |
| 273 | -0.26 | 218 | -1.31 | 216 | -1.35 | 298 | 0.21 | 297 | 0.20 |
| 246 | -0.78 | 276 | -0.21 | 255 | -0.61 | 352 | 1.25 | 331 | 0.84 |
| 282 | -0.09 | 323 | 0.69 | 292 | 0.10 | 318 | 0.60 | 242 | -0.85 |
| 326 | 0.75 | 368 | 1.55 | 298 | 0.21 | 190 | -1.85 | 236 | -0.97 |
| 314 | 0.52 | 366 | 1.51 | 193 | -1.79 | 165 | -2.33 | 235 | -0.99 |
| 350 | 1.21 | 212 | -1.43 | 284 | -0.05 | 215 | -1.37 | 256 | -0.59 |
| 288 | 0.02 | 235 | -0.99 | 295 | 0.16 | 279 | -0.15 | 253 | -0.64 |
| 251 | -0.68 | 260 | -0.51 | 331 | 0.84 | 296 | 0.18 | 246 | -0.78 |
| 287 | 0.00 | 302 | 0.29 | 306 | 0.37 | 289 | 0.04 | 285 | -0.03 |
| 295 | 0.16 | 344 | 1.09 | 308 | 0.41 | 193 | -1.79 | 232 | -1.05 |
| 272 | -0.28 | 366 | 1.51 | 242 | -0.85 | 202 | -1.62 | 280 | -0.13 |
| 286 | -0.01 | 294 | 0.14 | 264 | -0.43 | 249 | -0.72 | 326 | 0.75 |
| 224 | -1.20 | 253 | -0.64 | 240 | -0.89 | 302 | 0.29 | 366 | 1.51 |
| 271 | -0.30 | 292 | 0.10 | 261 | -0.49 | 328 | 0.79 | 379 | 1.76 |
| 308 | 0.41 | 311 | 0.46 | 244 | -0.82 | 335 | 0.92 | 257 | -0.57 |
| 310 | 0.44 | 335 | 0.92 | 277 | -0.19 | 258 | -0.55 | 312 | 0.48 |
| 321 | 0.65 | 370 | 1.59 | 282 | -0.09 | 211 | -1.45 | 349 | 1.19 |
| 335 | 0.92 | 245 | -0.80 | 268 | -0.36 | 228 | -1.12 | 379 | 1.76 |
| 266 | -0.40 | 251 | -0.68 | 298 | 0.21 | 318 | 0.60 | 380 | 1.78 |
| 268 | -0.36 | 270 | -0.32 | 307 | 0.39 | 282 | -0.09 | 258 | -0.55 |
| 307 | 0.39 | 306 | 0.37 | 317 | 0.58 | 349 | 1.19 | 201 | -1.64 |
| 334 | 0.90 | 326 | 0.75 | 296 | 0.18 | 141 | -2.78 | 243 | -0.84 |
| 367 | 1.53 | 362 | 1.44 | 281 | -0.11 | 235 | -0.99 | 310 | 0.44 |
| 355 | 1.30 | 290 | 0.06 | 298 | 0.21 | 249 | -0.72 | 353 | 1.26 |
| 202 | -1.62 | 264 | -0.43 | 329 | 0.81 | 249 | -0.72 | 374 | 1.67 |
| 187 | -1.91 | 297 | 0.20 | 355 | 1.30 | 323 | 0.69 | 296 | 0.18 |
| 245 | -0.80 | 313 | 0.50 | 349 | 1.19 | 367 | 1.53 | 291 | 0.08 |
| 293 | 0.12 | 360 | 1.40 | 354 | 1.28 | 257 | -0.57 | 320 | 0.63 |
| 287 | 0.00 | 367 | 1.53 | 267 | -0.38 | 201 | -1.64 | 320 | 0.63 |
| 318 | 0.60 | 190 | -1.85 | 239 | -0.91 | 229 | -1.10 | 384 | 1.86 |
| 201 | -1.64 | 191 | -1.83 | 296 | 0.18 | 265 | -0.42 | 371 | 1.61 |
| 188 | -1.89 | 236 | -0.97 | 316 | 0.56 | 297 | 0.20 | 248 | -0.74 |
| 210 | -1.47 | 285 | -0.03 | 350 | 1.21 | 252 | -0.66 | 248 | -0.74 |
| 240 | -0.89 | 297 | 0.20 | 349 | 1.19 | 244 | -0.82 | 316 | 0.56 |
| 279 | -0.15 | 315 | 0.54 | 299 | 0.23 | 229 | -1.10 | 333 | 0.88 |
| 300 | 0.25 | 234 | -1.01 | 288 | 0.02 | 228 | -1.12 | 348 | 1.17 |
| 170 | -2.23 | 213 | -1.41 | 328 | 0.79 | 290 | 0.06 | 352 | 1.25 |
| 147 | -2.67 | 259 | -0.53 | 350 | 1.21 | 310 | 0.44 | 305 | 0.35 |
| 217 | -1.33 | 253 | -0.64 | 366 | 1.51 | 343 | 1.07 | 316 | 0.56 |
| 273 | -0.26 | 288 | 0.02 | 384 | 1.86 | 263 | -0.45 | 375 | 1.68 |
| 297 | 0.20 | 314 | 0.52 | 245 | -0.80 | 258 | -0.55 | 371 | 1.61 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 342 | 1.05 | 215 | -1.37 | 279 | -0.15 | 273 | -0.26 | 383 | 1.84 |
| 277 | -0.19 | 177 | -2.10 | 310 | 0.44 | 303 | 0.31 | 362 | 1.44 |
| 282 | -0.09 | 165 | -2.33 | 235 | -0.99 | 309 | 0.42 | 342 | 1.05 |
| 268 | -0.36 | 215 | -1.37 | 256 | -0.59 | 327 | 0.77 | 277 | -0.19 |
| 309 | 0.42 | 279 | -0.15 | 253 | -0.64 | 273 | -0.26 | 218 | -1.31 |
| 334 | 0.90 | 296 | 0.18 | 246 | -0.78 | 246 | -0.78 | 276 | -0.21 |
| 309 | 0.42 | 289 | 0.04 | 285 | -0.03 | 282 | -0.09 | 323 | 0.69 |
| 327 | 0.77 | 193 | -1.79 | 232 | -1.05 | 326 | 0.75 | 368 | 1.55 |
| 273 | -0.26 | 202 | -1.62 | 280 | -0.13 | 314 | 0.52 | 366 | 1.51 |
| 246 | -0.78 | 249 | -0.72 | 326 | 0.75 | 350 | 1.21 | 212 | -1.43 |
| 282 | -0.09 | 302 | 0.29 | 366 | 1.51 | 288 | 0.02 | 235 | -0.99 |
| 326 | 0.75 | 328 | 0.79 | 379 | 1.76 | 251 | -0.68 | 260 | -0.51 |
| 314 | 0.52 | 335 | 0.92 | 257 | -0.57 | 287 | 0.00 | 302 | 0.29 |
| 350 | 1.21 | 258 | -0.55 | 312 | 0.48 | 295 | 0.16 | 344 | 1.09 |
| 288 | 0.02 | 211 | -1.45 | 349 | 1.19 | 272 | -0.28 | 366 | 1.51 |
| 251 | -0.68 | 228 | -1.12 | 379 | 1.76 | 286 | -0.01 | 294 | 0.14 |
| 287 | 0.00 | 318 | 0.60 | 380 | 1.78 | 224 | -1.20 | 253 | -0.64 |
| 295 | 0.16 | 282 | -0.09 | 258 | -0.55 | 271 | -0.30 | 292 | 0.10 |
| 272 | -0.28 | 349 | 1.19 | 201 | -1.64 | 308 | 0.41 | 311 | 0.46 |
| 286 | -0.01 | 141 | -2.78 | 243 | -0.84 | 310 | 0.44 | 335 | 0.92 |
| 281 | -0.11 | 235 | -0.99 | 310 | 0.44 | 321 | 0.65 | 370 | 1.59 |
| 298 | 0.21 | 249 | -0.72 | 353 | 1.26 | 335 | 0.92 | 245 | -0.80 |
| 329 | 0.81 | 249 | -0.72 | 374 | 1.67 | 266 | -0.40 | 251 | -0.68 |
| 355 | 1.30 | 323 | 0.69 | 296 | 0.18 | 268 | -0.36 | 270 | -0.32 |
| 349 | 1.19 | 367 | 1.53 | 291 | 0.08 | 307 | 0.39 | 306 | 0.37 |
| 354 | 1.28 | 257 | -0.57 | 320 | 0.63 | 334 | 0.90 | 326 | 0.75 |
| 267 | -0.38 | 201 | -1.64 | 320 | 0.63 | 367 | 1.53 | 362 | 1.44 |
| 239 | -0.91 | 229 | -1.10 | 384 | 1.86 | 355 | 1.30 | 290 | 0.06 |
| 296 | 0.18 | 265 | -0.42 | 371 | 1.61 | 202 | -1.62 | 264 | -0.43 |
| 316 | 0.56 | 297 | 0.20 | 248 | -0.74 | 187 | -1.91 | 297 | 0.20 |
| 350 | 1.21 | 252 | -0.66 | 248 | -0.74 | 245 | -0.80 | 313 | 0.50 |
| 349 | 1.19 | 244 | -0.82 | 316 | 0.56 | 293 | 0.12 | 360 | 1.40 |
| 299 | 0.23 | 229 | -1.10 | 333 | 0.88 | 287 | 0.00 | 367 | 1.53 |
| 288 | 0.02 | 228 | -1.12 | 348 | 1.17 | 318 | 0.60 | 190 | -1.85 |
| 328 | 0.79 | 290 | 0.06 | 352 | 1.25 | 201 | -1.64 | 191 | -1.83 |
| 350 | 1.21 | 310 | 0.44 | 305 | 0.35 | 188 | -1.89 | 236 | -0.97 |
| 366 | 1.51 | 343 | 1.07 | 316 | 0.56 | 210 | -1.47 | 285 | -0.03 |
| 384 | 1.86 | 263 | -0.45 | 375 | 1.68 | 240 | -0.89 | 297 | 0.20 |
| 245 | -0.80 | 258 | -0.55 | 371 | 1.61 | 279 | -0.15 | 315 | 0.54 |
| 279 | -0.15 | 273 | -0.26 | 383 | 1.84 | 300 | 0.25 | 234 | -1.01 |
| 310 | 0.44 | 303 | 0.31 | 362 | 1.44 | 170 | -2.23 | 213 | -1.41 |
| 298 | 0.21 | 297 | 0.20 | 282 | -0.09 | 147 | -2.67 | 259 | -0.53 |
| 352 | 1.25 | 331 | 0.84 | 268 | -0.36 | 217 | -1.33 | 253 | -0.64 |
| 318 | 0.60 | 242 | -0.85 | 309 | 0.42 | 273 | -0.26 | 288 | 0.02 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 190 | -1.85 | 236 | -0.97 | 334 | 0.90 | 297 | 0.20 | 314 | 0.52 |
| 215 | -1.37 | 255 | -0.61 | 193 | -1.79 | 331 | 0.84 | 242 | -0.85 |
| 177 | -2.10 | 292 | 0.10 | 284 | -0.05 | 306 | 0.37 | 264 | -0.43 |
| 216 | -1.35 | 298 | 0.21 | 295 | 0.16 | 308 | 0.41 | 240 | -0.89 |

## Appendix L

## CVR of Student Perception Scale towards Teaching

| S .No. | | E | U | N | CVR |
|---|---|---|---|---|---|
| 1 | The teacher informs students about the objectives of the lesson. | 9 | | | 1 |
| 2 | The teacher makes the content very simple. | 9 | | | 1 |
| 3 | The teacher asks questions about the previous knowledge. | 8 | 1 | | 0.77778 |
| 4 | The teacher motivates students to perform activities. | 9 | | | 1 |
| 5 | The teacher encourages students to discuss problems. | 8 | 1 | | 0.77778 |
| 6 | The teacher uses variety of resources to get responses from students. | 9 | | | 1 |
| 7 | The teacher writes important points on the black/white board. | 8 | 1 | | 0.77778 |
| 8 | The teacher does not make mistakes in board work. | 9 | | | 1 |
| 9 | The teacher encourages students to develop their own understanding. | 8 | 1 | | 0.77778 |
| 10 | The teacher promotes cooperation among students. | 5 | | | 0.11111 |
| 11 | The teacher encourages students to ask questions. | 8 | 1 | | 0.77778 |
| 12 | The teacher asks for examples from immediate surroundings. | 9 | | | 1 |
| 13 | The teacher relates the content with daily life. | 9 | | | 1 |
| 14 | The teacher encourages students to guess the topic. | 9 | | | 1 |
| 15 | The teacher involves all the students in learning process. | 9 | | | 1 |
| 16 | The teacher usually forms small groups for academic discussions. | 9 | | | 1 |
| 17 | The teacher encourages students to present their explanation. | 8 | 1 | | 0.77778 |
| 18 | The teacher praises the performer students. | 8 | 1 | | 0.77778 |
| 19 | The teacher gives rewards for best answers. | 9 | | | 1 |
| 20 | The teacher allows students to work at their own pace. | 9 | | | 1 |
| 21 | The teacher uses audio visual aids. | 8 | 1 | | 0.77778 |
| 22 | The teacher uses web resources to give actual experience. | 8 | 1 | | 0.77778 |
| 23 | The teacher uses technology to connect students with the experts. | 9 | | | 1 |
| 24 | The teacher integrates technology with classroom resources. | 9 | | | 1 |
| 25 | The teacher uses technology in evaluation. | 9 | | | 1 |
| 26 | The teacher does not miss classes. | 9 | | | 1 |
| 27 | The teacher always comes to class fully | 9 | | | 1 |

| | | | | | |
|---|---|---|---|---|---|
| | prepared. | | | | |
| 28 | The teacher is un biased. | 9 | | | 1 |
| 29 | The teacher uses civilized language with the students. | 9 | | | 1 |
| 30 | The teacher encourages students to develop their own value system. | 8 | 1 | | 0.77778 |
| 31 | The teacher always comes to class well dressed. | 4 | 2 | 3 | -0.1111 |
| 32 | The teacher helps the slow learners. | 8 | 1 | | 0.77778 |
| 33 | The teacher assigns extra tasks to students who completes task early. | 8 | 1 | | 0.77778 |
| 34 | The teacher shows passion for teaching. | 7 | | | 0.55556 |
| 35 | The teacher respects the individuality of each student. | 8 | 1 | | 0.77778 |
| 36 | The teacher shows positive behavior towards students. | 8 | 1 | | 0.77778 |
| 37 | The teacher communicates effectively with every student. | 5 | | | 0.11111 |
| 38 | The teacher gives clear and precise instructions. | 8 | 1 | | 0.77778 |
| 39 | The teacher involves students in setting classroom rules. | 7 | | | 0.55556 |
| 40 | The teacher shows concern with every student in the class. | 8 | 1 | | 0.77778 |
| 41 | The teacher corrects inappropriate behavior. | 9 | | | 1 |
| 42 | The teacher does not yell at students. | 9 | | | 1 |
| 43 | The teacher responds at once to the issues relating to behavior. | 9 | | | 1 |
| 44 | The teacher keeps the students busy on one or the other task. | 6 | | 3 | 0.33333 |
| 45 | The teacher makes evaluation criteria clear to every student. | 9 | | | 1 |
| 46 | The teacher encourages self evaluations. | 9 | | | 1 |
| 47 | The teacher encourages peer evaluations. | 9 | | | 1 |
| 48 | The teacher varies assessment techniques frequently. | 9 | | | 1 |
| 49 | The teacher uses on-line resources in assessment. | 9 | | | 1 |
| 50 | The teacher gives home work as per level of students. | 8 | 1 | | 0.77778 |

## Appendix M

## Item evaluation (p-values for perception scale)

| S. No. | Statement | p-value |
|---|---|---|
| 1 | The teacher informs students about the objectives of the lesson. | 0.001 |
| 2 | The teacher makes the content very simple. | 0.006 |
| 3 | The teacher asks questions about the previous knowledge. | 0.000 |
| 4 | The teacher motivates students to perform activities. | 0.000 |
| 5 | The teacher encourages students to discuss problems. | 0.000 |
| 6 | The teacher uses variety of resources to get responses from students. | 0.000 |
| 7 | The teacher writes important points on the black/white board. | 0.000 |
| 8 | The teacher does not make mistakes in board work. | 0.000 |
| 9 | The teacher encourages students to develop their own understanding. | 0.000 |
| 10 | The teacher encourages students to ask questions. | 0.000 |
| 11 | The teacher asks for examples from immediate surroundings. | 0.000 |
| 12 | The teacher relates the content with daily life. | 0.000 |
| 13 | The teacher encourages students to guess the topic. | 0.000 |
| 14 | The teacher involves all the students in learning process. | 0.000 |
| 15 | The teacher usually forms small groups for academic discussions. | 0.000 |
| 16 | The teacher encourages students to present their explanation. | 0.000 |
| 17 | The teacher praises the performer students. | 0.000 |
| 18 | The teacher gives rewards for best answers. | 0.002 |
| 19 | The teacher allows students to work at their own pace. | 0.000 |
| 20 | The teacher uses audio visual aids. | 0.059 |
| 21 | The teacher uses web resources to give actual experience. | 0.000 |
| 22 | The teacher uses technology to connect students with the experts. | 0.000 |
| 23 | The teacher integrates technology with classroom resources. | 0.000 |
| 24 | The teacher uses technology in evaluation. | 0.640 |
| 25 | The teacher does not miss classes. | 0.937 |
| 26 | The teacher always comes to class fully prepared. | 0.000 |
| 27 | The teacher is un biased. | 0.000 |
| 28 | The teacher uses civilized language with the students. | 0.000 |
| 29 | The teacher encourages students to develop their own value system. | 0.000 |
| 30 | The teacher helps the slow learners. | 0.000 |
| 31 | The teacher assigns extra tasks to students who completes task early. | 0.503 |
| 32 | The teacher respects the individuality of each student. | 0.000 |
| 33 | The teacher shows positive behavior towards students. | 0.000 |
| 34 | The teacher gives clear and precise instructions. | 0.000 |
| 35 | The teacher shows concern with every student in the class. | 0.000 |
| 36 | The teacher corrects inappropriate behavior. | 0.000 |
| 37 | The teacher does not yell at students. | 0.000 |
| 38 | The teacher responds at once to the issues relating to behavior. | 0.000 |
| 39 | The teacher makes evaluation criteria clear to every student. | 0.000 |
| 40 | The teacher encourages self evaluations. | 0.002 |
| 41 | The teacher encourages peer evaluations. | 0.000 |
| 42 | The teacher varies assessment techniques frequently. | 0.000 |
| 43 | The teacher uses on-line resources in assessment. | 0.060 |
| 44 | The teacher gives home work as per level of students. | 0.000 |

# Appendix N

## Student Perception Scale towards Teaching

Name of student: ______________________ Gender: __________________________________

Age: __________________________________ Class: ____________________________________

Name of subject teacher: _______________________ Subject: ______________________________

Name of school: ______________________________________________________________________

Type of School: _____________________________ Date: ____________________________________

**Instructions:**
Encircle the appropriate rating as per your observation.
(Abbreviations: SDA- Strongly Disagree, DA- Disagree, N- Neutral, A- Agree, SA-Strongly Agree)

| S. No. | Statement | SDA | DA | N | A | SA |
|---|---|---|---|---|---|---|
| 1 | The teacher informs students about the objectives of the lesson. | 1 | 2 | 3 | 4 | 5 |
| 2 | The teacher makes the content very simple. | 1 | 2 | 3 | 4 | 5 |
| 3 | The teacher asks questions about the previous knowledge. | 1 | 2 | 3 | 4 | 5 |
| 4 | The teacher motivates students to perform activities. | 1 | 2 | 3 | 4 | 5 |
| 5 | The teacher encourages students to explore answers. | 1 | 2 | 3 | 4 | 5 |
| 6 | The teacher uses variety of resources to get responses from students. | 1 | 2 | 3 | 4 | 5 |
| 7 | The teacher writes important points on the black/white board. | 1 | 2 | 3 | 4 | 5 |
| 8 | The teacher does not make mistakes in board work. | 1 | 2 | 3 | 4 | 5 |
| 9 | The teacher encourages students to develop their own understanding. | 1 | 2 | 3 | 4 | 5 |
| 10 | The teacher encourages students to ask questions. | 1 | 2 | 3 | 4 | 5 |
| 11 | The teacher asks for examples from immediate surroundings. | 1 | 2 | 3 | 4 | 5 |
| 12 | The teacher relates the content with daily life. | 1 | 2 | 3 | 4 | 5 |
| 13 | The teacher encourages students to guess the topic. | 1 | 2 | 3 | 4 | 5 |
| 14 | The teacher involves all the students in learning process. | 1 | 2 | 3 | 4 | 5 |
| 15 | The teacher usually forms small groups for academic discussions. | 1 | 2 | 3 | 4 | 5 |
| 16 | The teacher encourages students to present their explanation. | 1 | 2 | 3 | 4 | 5 |
| 17 | The teacher praises the performer students. | 1 | 2 | 3 | 4 | 5 |
| 18 | The teacher gives rewards for best answers. | 1 | 2 | 3 | 4 | 5 |
| 19 | The teacher allows students to work at their own pace. | 1 | 2 | 3 | 4 | 5 |
| 20 | The teacher uses web resources to give real experience. | 1 | 2 | 3 | 4 | 5 |
| 21 | The teacher uses technology to connect students with the experts. | 1 | 2 | 3 | 4 | 5 |
| 22 | The teacher integrates technology with classroom resources. | 1 | 2 | 3 | 4 | 5 |
| 23 | The teacher always comes to class fully prepared. | 1 | 2 | 3 | 4 | 5 |
| 24 | The teacher is un biased. | 1 | 2 | 3 | 4 | 5 |
| 25 | The teacher uses civilized language with the students. | 1 | 2 | 3 | 4 | 5 |
| 26 | The teacher encourages students to develop their own value system. | 1 | 2 | 3 | 4 | 5 |
| 27 | The teacher helps the slow learners. | 1 | 2 | 3 | 4 | 5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 28 | The teacher respects the individuality of each student. | 1 | 2 | 3 | 4 | 5 |
| 29 | The teacher shows positive behavior towards students. | 1 | 2 | 3 | 4 | 5 |
| 30 | The teacher gives clear and precise instructions. | 1 | 2 | 3 | 4 | 5 |
| 31 | The teacher shows concern with every student in the class. | 1 | 2 | 3 | 4 | 5 |
| 32 | The teacher corrects inappropriate behavior. | 1 | 2 | 3 | 4 | 5 |
| 33 | The teacher does not yell at students. | 1 | 2 | 3 | 4 | 5 |
| 34 | The teacher responds at once to the issues relating to behavior. | 1 | 2 | 3 | 4 | 5 |
| 35 | The teacher makes evaluation criteria clear to every student. | 1 | 2 | 3 | 4 | 5 |
| 36 | The teacher encourages self-evaluations. | 1 | 2 | 3 | 4 | 5 |
| 37 | The teacher encourages peer evaluations. | 1 | 2 | 3 | 4 | 5 |
| 38 | The teacher varies assessment techniques frequently. | 1 | 2 | 3 | 4 | 5 |
| 39 | The teacher gives home work as per level of students. | 1 | 2 | 3 | 4 | 5 |

## Appendix O

**CVR for Interview schedule for school teachers**

| S .No. | | E | U | N | CVR |
|---|---|---|---|---|---|
| 1. | Do you feel that our student teachers are teaching as per the expectations of the school? How? | 9 | | | 1 |
| 2 | Are they giving importance to discipline in the campus and classroom? | 7 | | 2 | 0.55556 |
| 3 | Are our student teachers displaying kindness and respect for the school authorities? | 7 | | 2 | 0.55556 |
| 4 | Are they coming well prepared with lesson plans and teaching aids required in teaching? | 9 | | | 1 |
| 5 | Are they creating challenging learning situations for learners in the classroom? Give some examples. | 8 | 1 | | 0.77778 |
| 6 | Do they involve learners in the exploration of new knowledge? Cite some examples. | 9 | | | 1 |
| 7 | Do they share information with you that is relevant to lesson? | 4 | 2 | 3 | -0.1111 |
| 8 | Do you find our students passionate about teaching & learning process? How? | 9 | | | 1 |
| 9 | What different types of technologies they are using in the classroom? | 8 | 1 | | 0.77778 |
| 10 | How they display sensitivity to the needs of students? | 5 | 2 | 3 | 0.11111 |
| 11 | Do they show dedication to the teaching profession? | 5 | 2 | 3 | 0.11111 |
| 12 | Are they using mobile or computer to connect learners to outside experts? Mention some reference. | 9 | | | 1 |
| 13 | Are they using internet in the teaching learning process? What sort of activities they are performing with Internet? | 9 | | | 1 |
| 14 | How they encourage learners to apply concepts learned in classroom in to their real life? | 9 | | | 1 |
| 15 | Are they discussing real case studies and problems of society in the classroom? Give some examples. | 9 | | | 1 |
| 16 | Do they give lot of activities aimed at facilitating students' intellectual development? | 7 | | 2 | 0.55556 |
| 17 | How they encourage the learners to perform at higher levels? | 8 | 1 | | 0.77778 |

| | | | | | |
|---|---|---|---|---|---|
| 18 | Mention some of the teaching learning strategies they are using in the classroom. | 8 | 1 | | 0.77778 |
| 19 | Are they regular in the school & respect the time schedule? | 9 | | | 1 |
| 20 | How do they manage various classroom practices? | 9 | | | 1 |
| 21 | Do they ask recapitulatory questions towards the end of their class? | 8 | 1 | | 0.77778 |
| 22 | Are they using technology in the evaluation? How? | 8 | 1 | | 0.77778 |
| 23 | What sort of remedial help they provide to the learners? | 9 | | | 1 |
| 24 | Are you satisfied with the home work given by them? | 9 | | | 1 |
| 25 | Do they explain immediately parts of lessons that are unclear to the students? | 5 | 3 | 2 | 0.11111 |

## Appendix P

### Interview schedule for school teachers

### INTERVIEW SCHEDULE FOR PRINCIPALS/TEACHERS

1. Do you feel that our student teachers are teaching as per the expectations of the school? How?
2. Are they coming well prepared with lesson plans and teaching aids required in teaching?
3. Are they creating challenging learning situations for learners in the classroom? Give some examples.
4. Do they involve learners in the exploration of new knowledge? Cite some examples.
5. Do you find our students passionate about teaching & learning process? How?
6. What different types of technologies they are using in the classroom?
7. Are they using mobile or computer to connect learners to outside experts? Mention some reference.
8. Are they using internet in the teaching learning process? What sort of activities they are performing with Internet?
9. How they encourage learners to apply concepts learned in classroom in to their real life?
10. Are they discussing real case studies and problems of society in the classroom? Give some examples.
11. How they encourage the learners to perform at higher levels?
12. Mention some of the teaching learning strategies they are using in the classroom.
13. Are they regular in the school & respect the time schedule?
14. How do they manage various classroom practices?
15. Do they ask recapitulatory questions towards the end of their class?
16. Are they using technology in the evaluation? How?
17. What sort of remedial help they provide to the learners?
18. Are you satisfied with the home work given by them?

## Appendix Q

## CVR of Focus Group Interview schedule for learners

| S. No. | | E | U | N | CVR |
|---|---|---|---|---|---|
| 1 | Is your subject teacher tells about the objectives in the beginning of class? | 9 | | | 1 |
| 2 | Is your teacher allows you to formulate your own objectives? | 4 | 2 | 3 | -0.11111 |
| 3 | How your teacher tests your previous knowledge about the topic? | 8 | 1 | | 0.777778 |
| 4 | How your teacher motivates you to perform activities? | 9 | | | 1 |
| 5 | How your teacher uses black board in the teaching learning process? | 9 | | | 1 |
| 6 | Is your teacher maintains a good academic environment in the classroom? | 6 | | 3 | 0.333333 |
| 7 | Do you discuss & collaborate with each other in the class? | 8 | 1 | | 0.777778 |
| 8 | How your teacher promotes critical thinking skills among students. | 7 | | 2 | 0.555556 |
| 9 | What types of discussions usually happen in the class? | | | | |
| 10 | How often you ask questions to the teacher? | 8 | 1 | | 0.777778 |
| 11 | How your teacher takes care of individual differences among students? | 4 | 2 | 3 | -0.11111 |
| 12 | Does your teacher give feedback & reinforcement to you? How? | 8 | 1 | | 0.777778 |
| 13 | Are you using mobile/laptop/Internet in the class? How? | 8 | 1 | | 0.777778 |
| 14 | Does your teacher ask examples from daily life? | 9 | | | 1 |
| 15 | Do you think your teacher shows bias towards students? | 9 | | | 1 |

| | | | | | |
|---|---|---|---|---|---|
| 16 | Is your teacher uses pupils' idea in developing further instructions? | 7 | | 2 | 0.555556 |
| 17 | Do you get chance to interact with subject expert from outer community? How? | 8 | | 1 | 0.777778 |
| 18 | How your teacher motivates you to work at high level? | 5 | 1 | 3 | 0.111111 |
| 19 | Does your teacher use the language which is understanding and respectful? | 8 | 1 | | 0.777778 |
| 20 | How your teacher handles indisciplinary behavior of the students? | 9 | | | 1 |
| 21 | Do you feel satisfied with the evaluation done by teacher? | 9 | | | 1 |
| 22 | Is your teacher employs continuous and comprehensive evaluations practices? | 7 | | 2 | 0.555556 |
| 23 | What types of evaluation strategies are being used by teachers? | 8 | | 1 | 0.777778 |
| 24 | How your teacher plans extra help to students in need? | 8 | 1 | | 0.777778 |
| 25 | Is your teacher makes evaluation criteria very clear in the beginning of instruction. | 5 | | 4 | 0.111111 |
| 26 | Is your teacher maintains your evaluation records? | 6 | | 3 | 0.333333 |
| 27 | Do you like the home work/assignments given by your teacher? | 9 | | | 1 |
| 28 | Briefly describe the teaching of your teacher. | 9 | | | 1 |

## Appendix R

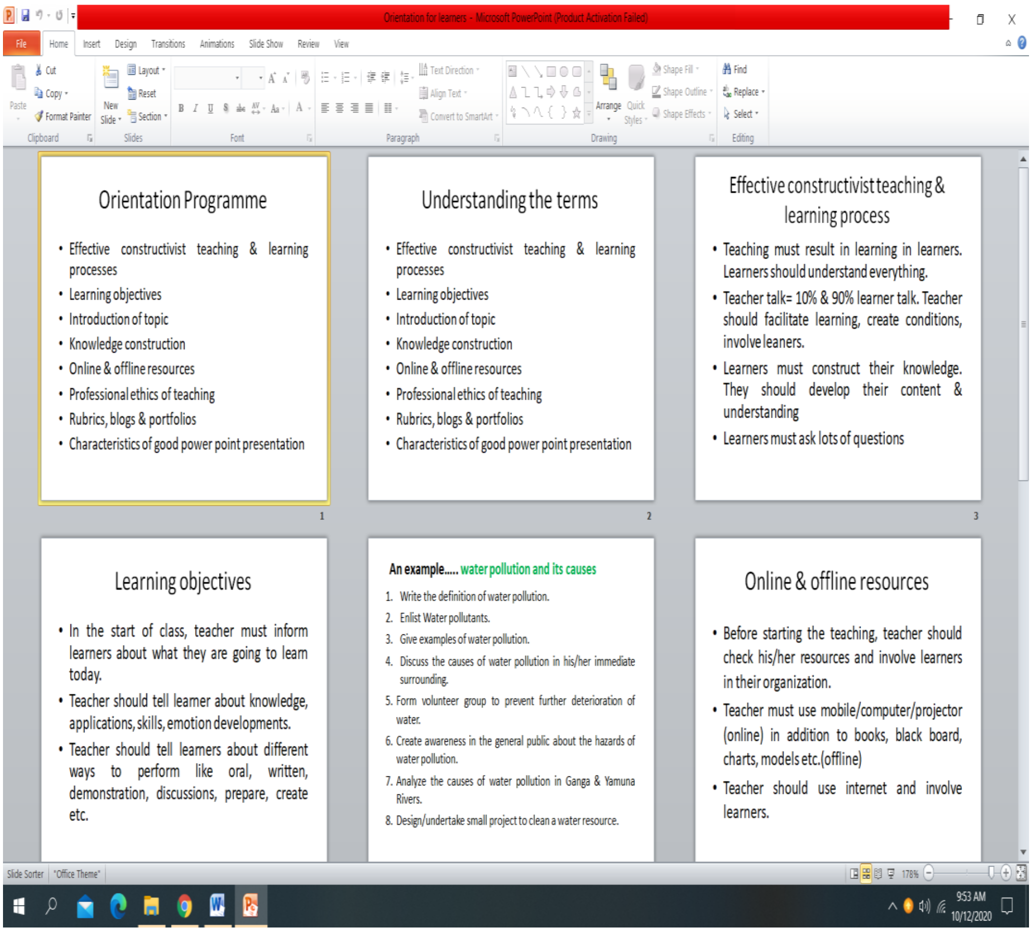
**Interview schedule for learners (Focus group)**

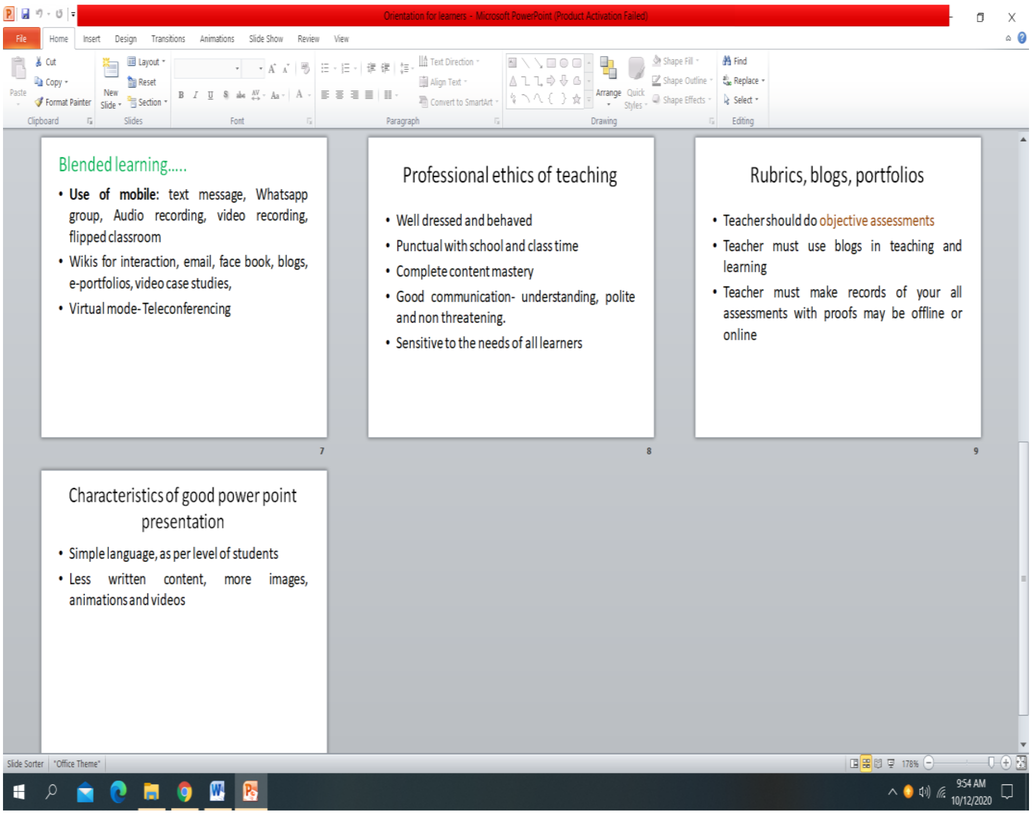
**Grade of participants: __________ Number of Participants: _____________**
**Date of Interview: ______________ Name of the school:__________________**
**Name of the student teachers teaching participants: _____________________**
**__________________________________________________________________**

1. Is your subject teacher tells about the objectives in the beginning of class?
2. How your teacher tests your previous knowledge about the topic?
3. How your teacher motivates you to perform activities?
4. How your teacher uses black board in the teaching learning process?
5. Do you discuss & collaborate with each other in the class?
6. What types of discussions usually happen in the class?
7. How often you ask questions to the teacher?
8. Does your teacher give feedback & reinforcement to you? How?
9. Are you using mobile/laptop/Internet in the class? How?
10. Does your teacher ask examples from daily life?
11. Do you think your teacher shows bias towards students?
12. Do you get chance to interact with subject expert from outer community? How?
13. Does your teacher use the language which is understanding and respectful?
14. How your teacher handles indisciplinary behavior of the students?
15. Do you feel satisfied with the evaluation done by teacher?
16. What types of evaluation strategies are being used by teachers?
17. How your teacher plans extra help to students in need?
18. Do you like the home work/assignments given by your teacher?
19. Briefly describe the teaching of your teacher.

# Appendix S

## Orientation Programme for Learners




Blended learning.....
• Use of mobile: text message, Whatsapp group, Audio recording, video recording, flipped classroom
• Wikis for interaction, email, face book, blogs, e-portfolios, video case studies,
• Virtual mode- Teleconferencing
7
Professional ethics of teaching
• Well dressed and behaved
• Punctual with school and class time
• Complete content mastery
• Good communication- understanding, polite and non threatening.
• Sensitive to the needs of all learners
8
Rubrics, blogs, portfolios
• Teacher should do objective assessments
• Teacher must use blogs in teaching and learning
• Teacher must make records of your all assessments with proofs may be offline or online
9
Characteristics of good power point presentation
• Simple language, as per level of students
• Less written content, more images, animations and videos

## Appendix T

## Lesson plans prepared by student teachers during experimentation/

Reg. No. of Student Teacher: [redacted]

Class: VII

Date: 12/09/18

Subject: Life sciences.

Avg. Age: 12-13 years.

Topic: Soil erosion - its causes and prevention.

Time Duration: 30min.

**SPECIFIC OBJECTIVES:** After the completion of the lesson, the learner will

(1) Write the definition of soil erosion.

(2) Enlist the causes of soil erosion.

(3) Explain the causes of soil erosion.

(4) Numerize strategies for the prevention of soil erosion.

(5) Summarize the concept of soil erosion. ??

(6) Google for the status of soil erosion in India. (7) explore for

(8) the instances of soil erosion using internet.

(9) search for the projects to prevent soil erosion.

Formulate more objectives -
- Consider Digital Bloom Taxonomy
- All Domains
- Case study / project → some

good

**SPECIFIC TEACHING AIDS:**

(1) video showing soil erosion, Images of soil erosion, discussion to find causes of soil erosion, brain-storming strategy about prevention of soil erosion.

(2) Multiple websites → geographyandyou.com.
indianetzone.com.

**Learning organization:** Student teacher takes attendance, checks home work and checks for internet connectivity.

| Expected Content | Presentation of Problematic event/ data/case | Hypotheses Formulation & Justification |
|---|---|---|
| Module I: Definition of soil erosion. | Teacher trainee will engage the students by showing them a video of soil erosion and ask what is happening in the video? | Students will see the video and frame hypothesis that upper layer of soil is removed when wind blows and when there is rain. Then teacher trainee will further ask what we can call this process? |
| Module II: Causes of soil erosion. | Teacher trainee will engage the students by allowing them to do group discussion about the causes of soil erosion and ask what they have discussed? Show images of soil erosion from Indian context or ask for examples / cases from their area. | Students will discuss among themselves and frame hypothesis that soil erosion is caused by- (a) cutting trees (b) due to excessive rain. Then teacher trainee will ask how these features leads to soil erosion? Classify — Natural / Artificial |

| Explanation | Increasing Critical Awareness | Assessment & Reflection |
|---|---|---|
| Students will explain that this is called as removal of soil layer. Then teacher trainee will refine that when water and wind remove the fertile topsoil reducing the productivity of soil. This process is called as soil erosion. | Students will further elaborate that soil erosion is more severe in areas such as bare land or deserts. In Elaboration provide condition / case studies. Search for the IIRS and find out the status of soil erosion in India. (geographyandyou.com) | (1) The removal of fertile soil from land by wind or water is called - (a) corrosion (b) erosion (c) effusion (d) diffusion. |
| Students will explain that the roots of plants bind the soil particles and if we cut the trees soil erodes. Then teacher trainee will refine that there are various causes of soil erosion such as deforestation, over-grazing and poor-farming. | Students will further elaborate that soil erosion leads to reduction in fertility of soil. Find out the %age of soil eroded by wind, water and flooding in India. In which states of India wind erosion is more common. (geographyandyou.com) | (1) Soil erosion is more severe in areas of high vegetation (T/F). (2) Classify factors of soil erosion into natural and artificial factors. (3) Enlist different causes of soil erosion. Now Q2,3 are reflection. |

There are Blending strategies
Interdisciplinary also with geography

| Expected Content | Presentation of Problematic event/ data/case | Hypotheses Formulation & Justification |
|---|---|---|
| Module III - Prevention of soil erosion. | Teacher trainee will engage the students by brainstorming from them by asking the question that-<br>(1) Is it necessary to prevent soil erosion?<br>(2) How can we prevent soil erosion? | Students will explore and frame hypothesis that Yes, it is necessary to prevent the soil erosion.<br>-Soil erosion can be prevented by<br>(a) planting trees.<br>(b) Using good farming methods.<br>Then teacher trainee will further ask why there is need to prevent soil erosion? |

| Explanation | Increasing Critical Awareness | Assessment & Reflection |
|---|---|---|
| Students will explain that to save fertile soil from soil erosion. Then teacher trainee will refine that soil erosion can be prevented by (a) Afforestation,<br>(b) Construction of dams,<br>(c) Crop rotation,<br>(d) Use shelter belts;<br>Then teacher trainee will ~~not~~ explain them by using board. | Students will further elaborate that there is different technique adopt in hilly areas, ~~by~~ to prevent soil erosion.<br>Search and enlist some of the projects initiated by GOI to prevent soil erosion in India. | (1) Which of the following is not a way to reduce soil erosion?<br>(a) Construction of dams<br>(b) Crop rotation<br>(c) Deforestation<br>(d) Afforestation.<br>(2) Why preventing soil erosion is necessary? |

**RECAPITULATION:**

Today we have discussed about soil erosion - causes and prevention. So, on the basis of today's discussion -

(1) Write the definition of soil erosion.
(2) Enlist the cause of soil erosion.
(3) Explain the causes of soil erosion.
(4) Numerize strategies for the prevention of soil erosion. Include all objectives in recapitulation
(5) Summarize the concept of soil erosion.

**HOME WORK:**

(1) Discuss with your parents and suggest ways to reduce soil erosion except those given in the book.
(2) Write a note on your ~~&~~ notebook on soil erosion.
(3) Give initiation.

DSK 18

**Signature of Mentor (Teacher Educator)**

**Reg. No.of Student Teacher:** [redacted] **Date:** 10/8/18.

**Class:** VI **Avg. Age:** 12.

**Subject:** Mathematics. **Time Duration:** 30 min.

**Topic:** Properties of Multiplication

**SPECIFIC OBJECTIVES:** After the completion of the lesson, the learner will

1. Understand the ~~pre~~ basic properties of multiplication
2. Name the various properties of multiplication
   - → Commutative property
   - → Associative "
   - → Identity "

Different objectives can be framed on these properties

3. From given examples learner will identify the property of multiplication (given in exploration)

**SPECIFIC TEACHING AIDS:**

3 Videos (showing the properties through animated story)

Images on properties of Multiplication

Work sheet

Learning organization: Student Teacher checks home work and makes contextual statements. She checks for Internet connectivity.

| Expected Content | Presentation of Problematic event/ data/case | Hypotheses Formulation & Justification |
| --- | --- | --- |
| 1. Commutative property axb= bxa | • Teacher will show a video to the students and at the end she will ask the students that what did they observed from that video | • students will tell them the teacher that 4x3= 3x4 means either if we change the position of multiplier it gives the same answer. |
| 2. Associative Property ax(bxc)=(axb)xc | Teacher trainee will show another video and ask them, what did they observed and explain it. | The students will tell her that (2x3)x4= 2x (3x4) Means in multiplication if we change the position of the factors, the product does not change. |

Use of video was good & creating interest in student

| Explanation | Increasing Critical Awareness | Assessment & Reflection |
| --- | --- | --- |
| Teacher will ask them to write some more examples, they will try to make some more like 1x2x3=3x2x1 or 2x3x1=1x3x1 5x2 = 2x5 | So in this we using inductive method teacher trainee will tell them that this is called Commutative property of Multiplication. a x b= b x a "When changing the the order of factors doesn't change the product" | • What is Commutative property of Multiplication? • Solve the following question:- 1. 20x1x10= 2. 400x1x200= |
| Teacher trainee will ask them to make atleast 5 examples based on associative Property. eg:- ~~ax(bxc)~~ students will write like this | Using inductive method again teacher trainee will tell them that this is called Associative Property of Multiplication it is written as: ax(bxc)=(axb)xc etc | • What is Associative property? • Write an example showing Associative property. |

| Expected Content | Presentation of Problematic event/ data/case | Hypotheses Formulation & Justification |
|---|---|---|
| 3. Identity Property. $a \times 1 = a$ | The teacher will again show a story telling video, showing the concept of Identity of property of Multiplication. At last the teacher will ask them what did they observed? | Students will say that when a number is Multiplied by 1, it gives the same answer like $10 \times 1 = 10$ $29 \times 1 = 29$ same |

| Explanation | Increasing Critical Awareness | Assessment & Reflection |
|---|---|---|
| $3 \times (4 \times 2) = 4 \times (2 \times 3)$ etc. | in this changing the position of factors doesn't affect the product. | |
| Now the teacher will ask them to make some more examples based on Identity property. like this $5 \times 1 = 5$ $99 \times 1 = 99$ etc. | So after giving enough number of examples, the teacher trainee will tell them that this is called Identity property of Multiplication. $a \times 1 = a$<br>In this, when a number is multiplied to 1, the answer is the same number | • What is Identity property?<br>• Which one of them show the identity property<br>a. $a \times 0 = 0$<br>b. $a + b = b + a$<br>c. $a \times 1 = a$<br>d. $a \times b = c$<br>Use materials in evaluation |

**RECAPITULATION:**

So, Students tell me what we have done today?
Students will say

- Multiplication Identities.

1. Commutative Property
2. Associative Property
3. Identity Property.

Answer the following Questions :-
Write the name of the property

a. $a \times 1 = a$ ⟶ ?
b. $a \times b = b \times a$ ⟶ ?
c. $a \times (b \times c) = (a \times b) \times c$ ⟶ ?

Try to involve all the students

**HOME WORK:**

Find out the answer & write the relative property

1. $100 \times 200 = 200 \times$ ?
2. $1100 \times 210 \times 320 = 320 \times 210 \times$ ?
3. $1100 \times 1 =$ ?

Give problems in Primary Critical Answers/ Elaborations/ explanations/
Ask for explanations in
Use worksheet with small students

Poonam
19/8/18

19/8/18

Signature of Mentor (Teacher Educator

**Reg. No. of Student Teacher:** 11713994

**Date:** 3-10-2018

**Class:** 8th

**Avg. Age:** 13 - 14 years

**Subject:** Social Science

**Time Duration:** 30 min.

**Topic:** Women and Reforms

**SPECIFIC OBJECTIVES: After the completion of the lesson, the learner will**

1. Enlist the different social evils prevalent in society in 19th century
2. Compare between the condition of women in 19th century and 21st century.
3. Explain the contribution of Raja Ram Mohan Roy for women welfare.
4. Describe the works of Ishwar Chander Vidyasagar for the betterment of ~~women~~ women.
5. Discuss the effect of Widow remarriage.

**SPECIFIC TEACHING AIDS:**

1. Pictures of social Evils. 2. Pictures of Social reformers.

Show Ted Talk of status of women by Leila Seth. Dowry inheritance right

**Learning organization:** Check laptop for working, Internet connection. Allow students to sit in systematic manner to watch video.

| Expected Content | Presentation of Problematic event/ data/case | Hypotheses Formulation & Justification |
|---|---|---|
| Module - I<br>Need for women reform Movements. | P.T. will show some pictures of female festicide, Sati system, Dowry system, Parda system.<br>P.T. will ask from students what have you observed in these pictures?<br>Show Teach Video here & allow students to explore | Students will say these are different system sati system Dowry system, Parda system and female foeticide.<br>P.T. will ask from students what kind of effect on women will be there, due to these systems? |
| Module - II<br>Raja Ram Mohan Roy. | P.T. will show some pictures of Raja Ram Mohan Roy with brief written description of their contribution for the betterment of women.<br>P.T. will ask from students what have you observed in these pictures? | Students will say these are the pictures of Raja Ram Mohan Roy and tell that he was in favour of widow-remarriage and he fought for women Rights.<br>P.T. will ask from students what was the necessety of these works? |

| Explanation | Increasing Critical Awareness | Assessment & Reflection |
|---|---|---|
| Students will say these evils will effect the women badly<br>P.T will refine their explanation that in 19th cen. in Indian society the condition of women was pitiable such as sati-system, female infanticide, slavery, parda system social evils prevalent in society. To eradicate these evils many religious and Social movement stated. | (1) To elaborate the concept P.T. will ask from Students what is difference between the condition of women in 19th century and at present time?<br>(2) Search for some religious and social movements started to eliminate these evils from society<br>(Allow use of mobile or Laptop here) | Fill ups.<br>(1) Many ______ were prevalent in the society in 19th century.<br>(2) To eradicate social evils many ______ and ______ started.<br>Why there was need for women reforms movements? |
| Students will explain for improve the condition of women all these things were required.<br>P.T. will refine their explanation that R.R.M. Roy was a social reformer. Due to his efforts Sati system banned in 1829 A.D. He condemned child marriage, polygamy, protest against killing of girls and Parda Pratha. He propagated for women education. | To elaborate the concept P.T. will ask from students how education can change the condition of women?<br>Which ideas did the following people support?<br>i) Dayanand Saraswati →<br>ii) Ishwar Chandra Vidyasagar →<br>iii) Jyotirao Phule →<br>Search for their contribution.<br>(Use rotation model here) | True/False<br>(1) Sati Prath banned in 1839 A.D.<br>(2) Raja Ram Mohan Roy condemned child marriage and polygamy. |

| Expected Content | Presentation of Problematic event/ data/case | Hypotheses Formulation & Justification |
|---|---|---|
| Module - III<br>Ishwar Chander Vidyasagar<br>Change engagement strategy<br>Show picture/video on social evils and explore the reformer who worked against it. | P.T. will show some pictures Ishwar chander Vidyasagar with brief discription of his works for betterment of women.<br>P.T. will ask from students What have you observed in these pictures? | Students will say these pictures shows Ishwar chander Vidyasagar introduced widow remarriage and work against polygamy.<br>P.T. will ask from student what is solution given by him for change the condition of women? |
| Module - IV<br>Swami Dayanand ji | P.T. will show some pictures of Swami Dayanand, will ask from students what is the name of this personality? | Students will this is picture of Swami Dayanand ji.<br>P.T. will ask from students who was Swami Dayanand ji? |

2020/11/6 22:3

| Explanation | Increasing Critical Awareness | Assessment & Reflection |
|---|---|---|
| Students will say he said education can change the status of women.<br>P.T. will refine their explanation He was a social reformer, who open 25 schools for girls. Due to his efforts Hindu widow Remarriage Act (1856) passed in 1856 A.D. | To elaborate the concept P.T. will ask from students, what would be the effect of widow remarriage Act? | M.C.Q<br>(1) How many schools were opened for girls by Ishwar chander?<br>(a) 25 (b) 30 (c) 15 (d) 20.<br>(2) When was Hindu widow Remarriage Act passed?<br>(A) 1856 A.D. (B) 1857 A.D.<br>(C) 1856 B.C. (D) 1846 A.D. |
| Students will say he was the founder of Arya Samaj.<br>P.T. will explain he was the founder of Arya Samaj, that condemned Sati system and dowry system. He started protest against child marriage. He opened Ashrams for widows and was in favour of widow remarriage. He also estab. schools for the education of women. | To elaborate the concept P.T. will ask from student what the other works done by Arya Samaj. | (1) Who was the founder of Arya Samaj?<br>(2) What kind of works done by Swami Dayanand ji for widows?<br>(3) What was done by Swami Dayanand ji for women education |

**RECAPITULATION:**

Students, today we have studied about women and reforms in 19th century. There were many social evils prevalent in society that need to be eradicate. For this many social reforms contributed to improve the condition of the women.

① What were the social evils prevalent in society in 19th century.

② What is done by Raja Ram Mohan Roy for betterment of women.

Match the following

| | | | |
|---|---|---|---|
| ① Sati Prath. | – | A | Swami Dayanand Ji |
| ② Hindu Widow Remarriage Act | – | (B) | 1829 |
| ③ Ashram for widows | – | (C) | 1856 |
| ④ 25 schools for girls | – | (D) | Ishwar Chander Vidyasagar |

**HOME WORK:**

① Write about the social evils against women that are still prevalent in society.

② Write about the five famous women from any profession.

③ Brief life sketch of Raja Ram Mohan Roy, Dayanand Saraswati and Ishwar Chander Vidyasagar.

✓ Change engagement strategy with every module.
✓ Work on throwing critical questions/ evaluative ques.

**Signature of Mentor (Teacher Educator)**

Subject: English

Topic: Adjective

Avg. Age:

Time Duration:

SPECIFIC OBJECTIVES: After the completion of the lesson, the learner will

1. write the definition of adjective
2. Enlist different kinds of adjective
3. Give examples of adjective of quality
4. From given examples identify the examples of adjectives of quality.
5. Use adjectives of quality and quantity in their written presentation
6. Find adjectives in given speeches ~~and~~ or sentences.

good

SPECIFIC TEACHING AIDS:

(i) real object, (ii) A written paragraph / Newspaper

(iii) A Speech (video), or worksheet (also pen) manner to watch video.

| Expected Content | Presentation of Problematic event/ data/case | Hypotheses Formulation & Justification |
| --- | --- | --- |
| Module-I Introduction of adjective | P.T will be perform the activity. P.T will Showing the bag and asked to students put hand in the bag and feel the object. P.T will ask them you can touch the object but they cannot look at the object. Improve grammatical construction | Students will think for some time and answer like (i) Bangle is circle shape (ii) Rubber band is hard. (iii) ball is hard (iv) The stone is hard object. P.T will ask them what are you observe this activity? good hypothesis formation |
| Module-II Adjective of quality. | P.T will Showing the video and ask them observe the carefully and Listen. P.T will ask them What are you observe this video? | Students will give answer i) House is very big ii) He is tall man (iii) |

| Explanation | Increasing Critical Awareness | Assessment & Reflection |
| --- | --- | --- |
| Students will explain answer - These object show that adjective. P.T will ask them today we learnt the "Adjective". P.T will explain that An adjective is a word that describes a noun or pronoun examples i) Ram is a good boy ii) Ball is hard. (iii) The pen is blue. (iv) this is a tall building. | Pupil teacher will elaborate the concept by asking question ① Write any paragraph using the adjective word in the sentence. Adjective tells: ① which — ? (2) How Much — ? (3) How many — You have three pens. (4) what kind — ? (5) whose — ? | i) Define adjective ii) Find out example of adjective in daily life. Improvement is there as compared to last lesson |
| P.T will explain that adjectives of quality means the kind quality or State of a person or thing Example (i) a blue pen | Give me example of adjective of quality in this classroom? | What is adjective of quality? ② Fill in the blank (i) Mango is very ___ fruit (ii) Rahul is ___ good (iii) Chandigradh |

| Expected Content | Presentation of Problematic event/ data/case | Hypotheses Formulation & Justification |
| --- | --- | --- |
| Module – III<br>Adjective of quantity. | P-T will conduct an activity. In this activity P-T will take two glasses.<br>Pupil teacher will put little water in a glass and the other glass put more water.<br>Pupil teacher will ask the question<br>How much water is there in The glass? | Students will answer that<br>i) There is ~~much~~ more water in the glass than ~~and~~ other glass<br>ii) There is little water in the glass.<br>generally |

| Explanation | Increasing Critical Awareness | Assessment & Reflection |
| --- | --- | --- |
| ii) A good boy<br>(iii) Ball is very small in size<br>(iv) Ball is of ~~shape~~ round shape | | is ___ place<br>(iv) Pen has ___ colar. |
| P-T will explain that these adjective show much and little ~~of~~ thing is meant. | Pupil teacher will elaborate the concept by asking question | Define an adjective of quantity? |
| Example<br>i) Some money<br>ii) I eat much food<br>(iii) He drinks little water<br>(less) | Underline the adjective of quantity in the following sentence<br>(i) A few books<br>ii) We eat much rice<br>iii) He drinks little milk.<br>(iv) Give me some money. | How to differentiate between fewer & less? (comparing)<br>① There are ? oranges in the basket. now that you have taken some<br>② My glass has ? ~~water~~ orange juice than yours<br>(Fill appropriate adjective) |
| | Use newspaper here and ask learners to identify different adjectives | |

**RECAPITULATION:**

At the end of lesson pupil teacher will say that today we have learnt about definition of adjective and its two kinds of adjective

(i) What is adjective?
(ii) Give me example of adjective in the classroom?
(iii) Underline the adjective in the following sentence
(a) Ludhiana is famous city.
(b) You give me some money.
(c) My old car is unsafe
(d) He ate some rice

Recapitulation is as per objectives framed.

(1) Clarify examples in to adjectives of quality & quantity - Foolish, little, no, large, enough, sufficient, honest, energetic

**HOME WORK:**

(i) Read the newspaper and underline adjective words and write their types.
(ii) Write any paragraph use in adjective and two type of adjective words.

3/5

Blend of traditional and online resources is there.
Activity, video, paragraphs were used as resources.
Improvement in grammatical construction required. - Use proper tenses.

Signature of Mentor (Teacher Educator)

Class: सातवीं

Avg. Age: 12-13 साल

Subject: हिन्दी

Time Duration: 40 मिनट

Topic: बुद्धि - बल

SPECIFIC OBJECTIVES: After the completion of the lesson, the learner will

विशिष्ट उद्देश्य बनाओ –

1. गद्यांशो की व्याख्या करेंगे।
2. कठिन शब्दों के अर्थ जानेंगे। बुद्धि बल पाठ में आये कठिन शब्दों के अर्थ लिखेंगे।
3. नये शब्दों से वाक्य बनाएंगे।
4. मुहावरों के अर्थ बताकर वाक्यों की रचना करेंगे।
5. छल - कपट का अलोपनात्मक वर्णन करने मे सक्षम होगें।
6. छत्रपति शिवाजी के जीवन व उनकी वीरता के बारे में जान सकेंगे।
7. औरंगजेब के षडयंत्र के बारे में जान सकेंगे।

Specific to lesson

SPECIFIC TEACHING AIDS:

वीर शिवाजी मराठा से सम्बंधित चलचित्र।

शिक्षण संगठन- छात्राध्यापिका गृहकार्य की जाँच करती है, कक्षा को यथास्थित व्यवस्थित करती है। कम्प्यूटर को चलाती है

| अपेक्षित विषय वस्तु | समस्या / घटना हेतु प्रस्तुति | परिकल्पना निरूपण और औचित्य | व्याख्या | आलोचनात्मक जागरूकता का बढ़ावा | मूल्यांकन एवं मीमांसा |
|---|---|---|---|---|---|
| (1) पाठ परिचय ~~'बुद्धि~~ 'बुद्धि-बल' | छात्राध्यापिका विद्यार्थियों पाठ परिचय के सम्बंध मे 'वीर मराठा शिवाजी' की चलचित्र दिखायेगी तथा प्रश्न करेगी कि आपने क्या देखा? | विद्यार्थी उत्तर देंगे कि इसमे 'वीर शिवाजी' महाशय के बारे, उनकी वीरता, चतुरता द्वारा उनके प्यार को उजागर किया गया है। छात्राध्यापिका - सही छात्राध्यापिका प्रश्न करेगी कि आप और इनके बारे में क्या जानते हो? | विद्यार्थी उत्तर देंगे कि यह बहादुर थे। मराठा थे। छात्राध्यापिका - सही वीर होने के साथ-साथ काफी चतुर भी थे। आज इन्ही की चतुराई के सम्बन्ध मे इनके जीवन से सम्बंधित एक घटना के बारे हम अपने पाठ 'बुद्धि-बल' मे पढेंगे। जो श्री धर्मपाल शास्त्री जी द्वारा रचित है। | इस विषय को विस्तृत करने के लिए ~~लिए~~ छात्राध्यापिका बुद्धि और बल शब्द के पर्यायवाची शब्द विद्यार्थियों को बताने के लिए कहेगी। | प्रश्नः- प्रश्न / उत्तर (1) बुद्धि-बल के लेखक का नाम क्या है? (2) इस पाठ में किससे सम्बंधित घटना का वर्णन किया गया है? |
| (2) आदर्श वाचन मुगलकाल - - - - - - - - दिन काटने लगे। | पाठ की ओर ध्यान केंद्रित करने हेतु छात्राध्यापिका उचित लय तथा भाषा का प्रयोग कर पाठ का आदर्श वाचन करेगी तथा विद्यार्थियों को ध्यान से सुनने के लिए कहेगी। | विद्यार्थी ध्यान से पाठ सुनेंगे। छात्राध्यापिका प्रश्न करेगी कि इस पाठ मे किन-किन पात्रों की बात की गई है? | विद्यार्थी उत्तर देंगे कि इस पाठ मे औरंगजेब, दिलेर खाँ, शिवाजी के बारे मे बताया गया है। छात्राध्यापिका - सही। यह पाठ इन्ही पात्रों से ~~पर~~ ~~आधा~~ सम्बंधित घटना | इस विषय को विस्तृत करने के लिए छात्राध्यापिका प्रश्न करेगी कि आपने पहले पाठ से सम्बंधित पात्रो के बारे सुना है? आप क्या जानते हो उनके बारे में? | प्रश्नः- रिक्त स्थान औरंगजेब ______ की सहायता से छत्रपति शिवाजी को पकड़ना चाहता है। |

| अपेक्षित विषय वस्तु | समस्या / घटना डेटा प्रस्तुति | परिकल्पना निरूपण और औचित्य | व्याख्या | आलोचनात्मक जागरूकता का बढ़ावा | मूल्यांकन एवं मीमांसा |
|---|---|---|---|---|---|
| (3) मुगलकाल - - - - - क्या तलवार से? | छात्राध्यापिका विद्यार्थी को गद्यांश पढ़ने के लिए कहेगी तथा बाकी विद्यार्थियों को कठिन शब्द रेखांकित करने को कहेगी। | विद्यार्थी ध्यान (पाठ) से सुन कठिन शब्द रेखांकित कर उनके अर्थ जानने का प्रयास करेंगे तथा इन्हें (कठिन शब्द) छात्राध्यापिका श्यामपट्ट पर लिखेगी। तथा विद्यार्थी को इस गद्यांश की व्याख्या करने को कहेगी। | विद्यार्थी गद्यांश की व्याख्या करेंगे कि इसमे औरंगजेब अपने सेनापति दिलेर खाँ से छत्रपति शिवाजी को पकड़ने के लिए कह रहा है। तथा दिलेर खाँ यह कार्य जयसिंह को सौंपने को कह रहा है। | इस विषय को विस्तृत करने के लिए छात्राध्यापिका विद्यार्थियों को वाक्य बनाने के लिए शब्द देगी जैसे:<br>(1) डरपोक<br>(2) साहसी<br>(3) गुण | प्रश्न :- सही / गलत<br>दिलेर खाँ एक कमज़ोर सेनापति था।<br>सही ☐<br>गलत ☐ |
| (4) दिलेर खाँ - - - - - आगरा से चल पड़े | छात्राध्यापिका विद्यार्थी को गद्यांश पढ़ने के लिए कहेगी तथा बाकी विद्यार्थियों को कठिन शब्द रेखांकित करने के लिए कहेगी। | विद्यार्थी गद्यांश ध्यान से सुन कठिन शब्द रेखांकित कर उनके अर्थ जानेंगे। इन शब्दार्थ को छात्राध्यापिका श्यामपट्ट पर लिखेगी। तथा विद्यार्थी को गद्यांश की व्याख्या करने के लिए कहेगी। | विद्यार्थी गद्यांश की व्याख्या करेंगे कि इसमे जयसिंह हिन्दु धर्म को आधार बना - कर छल से शिवाजी को आगरा के दरबार में उपस्थित होने के लिए कह रहा है। इससे उसे तथा दिलेर खाँ को ईनाम मिलेगा। | इस विषय को विस्तृत करने के लिए छात्राध्यापिका गद्यांश में आये मुहावरों के अर्थ बता वाक्य बनाने को कहेगी। जैसे<br>(1) एक और एक ग्यारह<br>(2) घर का भेदी लंका ढाये। | प्रश्न :- मिलान करो<br>धोखा — मनचाहा<br>उपस्थित — छल<br>मुँहमाँगा — हाज़िर होना |
| (5) किस छत्रपति - - - - - काटने लगे। | छात्राध्यापिका विद्यार्थी को गद्यांश पढ़ने के लिए कहेगी तथा अन्य विद्यार्थियों को कठिन शब्द रेखांकित करने के लिए कहेगी। | विद्यार्थी गद्यांश ध्यान से सुन कठिन शब्द रेखांकित कर उनके अर्थ जानेंगे। छात्राध्यापिका इन्हे श्यामपट्ट पर लिखेगी तथा विद्यार्थी को गद्यांश की व्याख्या करने के लिए कहेगी। | विद्यार्थी गद्यांश की व्याख्या करेंगे कि यहाँ औरंगजेब ने छल से छत्रपति शिवाजी को आगरा के किले में कैद कर लिया है। उसे पहले [illegible] | इस विषय को विस्तृत करने के लिए छात्राध्यापिका विद्यार्थियों से प्रश्न करेगी कि आपके साथ जीवन में कभी छल हुआ है? | प्रश्न :- प्रश्न / उत्तर<br>शिवाजी के दरबार मे आते ही औरंगजेब ने उसके बारे क्या कहा? |

**RECAPITULATION:**

इस विषय की पुनरावृत्ति छात्राध्यापिका करेगी कि आज हमने बुद्धि बल नामक पाठ पढ़ा। जिसमें मुगल सम्राट औरंगजेब छत्रपति शिवाजी को छल-कपट से पकड़ना चाहता है तथा उसके लिए उसने षड्यंत्र रचा।

1. औरंगजेब ने शिवाजी को पकड़ने के लिए किसकी सहायता ली?
2. दिलेर खाँ ने जयसिंह के कौन से गुण की बात कही।
3. 'चुंगल में फँसना' मुहावरे का अर्थ बता वाक्य बनाओ।

**HOME WORK:**

1. शब्दार्थ करें – उपस्थित, कायरता, छल, स्वतन्त्र, विश्वासघात।
2. मुहावरों के अर्थ जान वाक्य बनाए :– पहाड़ से टकराना, चिकनी-चुपड़ी बातें, टेढ़ी
3. अभ्यास में पहले चार प्रश्न (उत्तर) (प्रश्न लिखो)
4. 'छल-कपट' के विषय पर एक कहानी बनाकर लाएं।

## Appendix U

## Technological Evidences (Experimentation)

Student teacher showing verbal and non verbal behaviour (various stimuli)

Student teacher using traditional resources (model on abstract concept)


Student teacher doing board work

Student teacher using mobile to show video

Student teacher using globe as traditional resources


Student teacher interacting with learners

Student teacher involving learner on board work

Student teacher showing video to introdcue the lesson

Student teacher writing topic on the board

Model recitation by learner in language class

Explanation by the student teacher

Discussions with learners

Involvment of learners in an activity

Demonstartion through learners

Demonstration performance by learner

Individual performance by learner and evaluation by student teacher

Use of video in teaching learning process

Explanation through video

StudentTeacher shwoing video on the poem

Learners watching video with interest

StudentTeacher showing anamations using mobile

Learner participation in class, use of video

Learner involvment in experimentation on sound

Introducing the topic using video

Laerner engagement through question answers

Writing appropriate particulars on the board

Showing animated videoon the topic

Writing imporatnt points on the board

Using text boojk as resource to teach in the class

Correcting reading error of learners

Learner involvement in reading the content

Leraner involed in board work

Developing lesson through video

Student teacher showing video and learners attentively listening

Enagaging learners in discussions with the help of video

Learner participation showing the level of motivation

Explaining concepts with the help of video

Board work summary

Learner involvement in assessment