SECTION II

METHODOLOGY OF THE STUDY

2.1 Selection and Rationale of the Research Method

Experimental method describes what will happen when certain variables are carefully controlled or manipulated. The focus is on variable relationship. Deliberate manipulation is always a part of the experimental method.

Experimental research provides a systematic and logical method for answering the question. "If this is done under carefully controlled conditions, what will happen?" Researcher manipulates certain stimuli, treatments or environmental conditions and observes how the condition or behavior of the subject is affected or changed. Their manipulation is deliberate and systematic.

It is most sophisticated, exacting, and powerful method for discovering and developing organised body of knowledge. The immediate purpose of experimentation is to predict events in the experimental setting. The ultimate purpose is to generalize the variable relationship so that they may be applied outside the laboratory to a wider population of interest.

Experimentation in this study claims computer Multimedia as an independent variable. It is manipulated to inquire its impact on Constructivist approach of Student Teacher and Teacher Educators.

2.1.1 The Variables Involved in Present Study:

Following Dependent and Independent variables are involved in this study:

2.1.1.1 Independent Variable

Independent variables are inputs. They are manipulated to determine the relationship and they can affect the other variables.

For this study Computer Multimedia Package is an independent variable.

2.1.1.2 Dependent Variables

Dependent variables are products of independent variables. They are the resulted due to cause of independent variable.

The dependent variables in this study are-

a) Conceptualization of theoretical base of Constructivism.

b) Acquisition of Planning of Constructivism.

2.1.2 Selection and Rationale of the Experimental Design

Experimental design provides a plan or blue print for experimentation. There are various types of experimental designs having various purpose, appropriate use, advantages and disadvantages.

A research design appropriate for a particular research problem usually involves consideration at the following:

1. The mean of obtaining information.
2. The objectives and nature of the problem to be studied.
3. Explanation of the way in which selected means of obtaining information will be organized and reasoning leading to the selection.

Experimental design is the blueprint of the procedures that enable the researcher to test hypothesis by reaching valid conclusions about relationship between independent and dependent variable.

The adequacy of experimental design is judged by the degree to which they eliminate or minimize threats to experimental validity.

According to above said purpose Pre-test – Post-test single group Design has been used by researcher to determine the effectiveness of the developed Computer Multimedia Package.

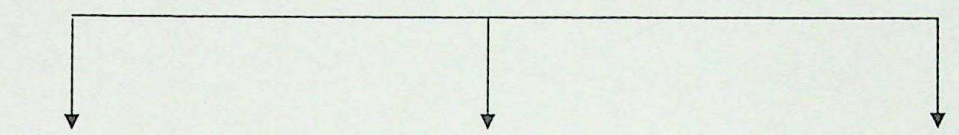
2.1.3 Population and Sampling

Student-teachers from Two Colleges of Education were selected in three groups – Language, Social Studies and General Science.

Training was provided to the concerned teacher educator's and to the student-teachers to use constructivism in their Practice Teaching Components by using Computer Multimedia Package.

Selection of the Sampling was as follows:

College of Education (N = 100)



Language Group	Social Study Group	General Science Group
(20)	(20)	(20)
(Marathi Method student Teachers)	(History Method student Teachers)	(Science Method student Teachers)

Figure. No. 2.1 Sample Used for Experimentation

The study was conducted in two phases Preparatory Phase and Experimental Phase.

2.2 The Preparatory Phase

The main purpose of the study was to develop Computer Multimedia Package for Constructivist learning teaching package. Hence the following tools was developed during the study.

1. Check list for finalizing abilities required to construct knowledge.
2. Five point rating scale for Evaluation of Multimedia.
3. Paper Pencil tests for preparing concept maps for student teachers based on Constructivism- Theory and Planning.
4. Teaching Plan Evaluation criteria- Check List.

The validity of the study depends on degree of truthfulness of the data. Therefore, tools of data collection have vital place in the data collection. The selection of appropriate

tools depends on nature of phenomenon under investigation, resources available, time available and nature of sample etc. For present study, following aspects are essential for data collection.

Table No. 2. 1

Aspects, Nature, Purpose of Tool & Data Collection

Aspects of Data Collection	Tool	Nature of Data	Purpose of Data Collection
Abilities required for Knowledge Construction	Check List	Qualitative	Identification Abilities required for Knowledge Construction
Constructivist Approach of Teacher Trainees	Five Point Rating Scale	Quantitative	Principle tool in this study for measurement of effectiveness of Computer Multimedia in terms of Constructivist Approach.
Developed Computer Multimedia Package based on Constructivist Approach.	Checklist	Quantitative	Evaluation of Developed Computer Multimedia Package based on Constructivist Approach.

2.2.1 Check List for Finalizing Abilities Required Constructing Knowledge.

This check list is used for identification of abilities required to Teacher for Knowledge Construction. Its measurement involves identifying all the abilities constituting the entire components of Knowledge construction. This tool provides a measure of abilities required to teacher for Knowledge construction. There are 14 components of Knowledge construction which encompass 44 abilities as enlisted below:

Table No. 2.2

Components of Knowledge Construction and related identified abilities

Sr. No.	Components of Knowledge Construction	Identified No. of Abilities
01	Collection of information and Sensitization	07
02	Initial information processing	05
03	Reflecting on initial information processing	07
04	Preliminary Knowledge Construct	08
05	Thinking Reflectively on Preliminary Knowledge Construct	07
06	First Knowledge Construct	09
07	Sharing with Peers and Experts	06
08	Thinking Reflectively on First Knowledge Construct	07
09	Formation of Second Knowledge Construct	09
10	Sharing of Second Knowledge Construct with Peers and Experts	06
11	Thinking Reflectively on Second Knowledge Construct	07
12	Formation of third Knowledge Construct	09
13	Thinking Reflectively and use of third Knowledge Construct	11
14	Modified Knowledge Construct.	09

2.2.2 Five Point Rating Scale for Determining Effectiveness of Computer Multimedia Package

This rating Scale has been used for measurement of effectiveness of Computer Multimedia in terms of Constructivist Approach. It is used as a Pre and Post test. This tool provides status of Teacher Trainees regarding Constructivist approach before and after the training given by researcher of Computer multimedia package based on Constructivist approach.

There are 25 items related to 05 aspects based on Constructivism which encompass the entire Knowledge Construction process in the classroom. They are related to 5 major aspects of Knowledge Construction processes namely, Process of Knowledge Construction, Abilities required for Knowledge Construction, Teacher Tasks for Knowledge Construction of Pupils, Change in Role of Teacher, and Change in Teaching Approach of Your Subject.

It is a 5points rating scale measuring corresponding of each item ranging from '0' for not at all and to '4' for very much.

2.2.3 Check List for Evaluation of Computer Multimedia

This check list is used for Evaluation of Developed Computer Multimedia Package based on Constructivist Approach. Its measurement involves identifying all the criteria's which make them a valid and reliable multimedia package. This tool provides a measure of all the characteristics required for computer multimedia package. There are o7 components regarding Technical aspects, Multimedia graphics, Adaptability, Instructional content, Screen elements, Teacher and Learner support material and age appropriateness of the Computer Multimedia Package with 23 items. It is given to the experts in the field of Education and Technology.

2.3 Development of Computer Multimedia Package

Packages are developed aiming to achieve specific educational objectives with least time and resources. They have to assure the quality, practicability, effectiveness regarding their objectives. Enrichment of package with these attributes is possible through systematic development of package.

Gustafson and Branch, in their book, *Survey of Instructional Development Models (4th Ed.)* (Gustafson & Branch, 2002) present instructional development model taxonomy to

1) Clarify the underlying assumptions of the different models, and
2) Identify the conditions under which each model might be most appropriately applied.

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The Gustafson and Branch taxonomy identify three categories to which a model might belong: classroom-oriented, product-oriented, or systems-oriented (Gustafson & Branch, 2002). These categories reflect the set of assumptions a model's creator(s) has (have) made regarding the conditions in which both the development of instructional materials and its subsequent delivery will take place (Gustafson & Branch, 2002).

Product-oriented models are normally used to produce an instructional package. Product production requires a team and a significant resource commitment and so calls for strong project management to stay within time and budget. A team would include an experienced instructional designer to perform some front-end analysis, develop the materials (rather than select them), and perform a significant amount of formative evaluation. The end product is likely to be widely distributed using a moderately to highly technical delivery media (Gustafson and Branch, 2001).

2.3.1 Selection of Model for Package Development

There are various popular models for package development like Morrison, Ross, Kemp: a classroom-oriented ID model, Seels & Glasgow: a product-oriented ID model, Dick, Carey, and Carey: a systems-oriented ID Model, three phase model for instructional package (Wittch, W. A. & Schuller C. F.), Gaya, T. K. (1988) proposed Basic Instructional System Design Model. Vanaja, M. and Rajshekhar, S. mentioned types of model in their book namely 'Educational Technology and Computer Education'.
They are as follows:

1) Objective based
2) Skill based
3) Competency based
4) Model based
5) Learner-Style based
6) Value based

In present study researcher adopted mixed strategy (objective based + Learner-Style based + Model based) while selecting model for package development.

Among these models Seels & Glasgow model is selected for this package development, because it:

- Provides planning and tracking mechanism.

- Provides useful communication tool.
- Facilitates documentation based on planning.
- Makes process teachable.
- Leads to measurable effects and to internally consistent products.
- May lead to quicker results for lower costs.
- May be efficient.
- Helps to create design specifications.
- Leads to products that are matched to user needs

The general structure of model is as shown in Figure No. 2.2

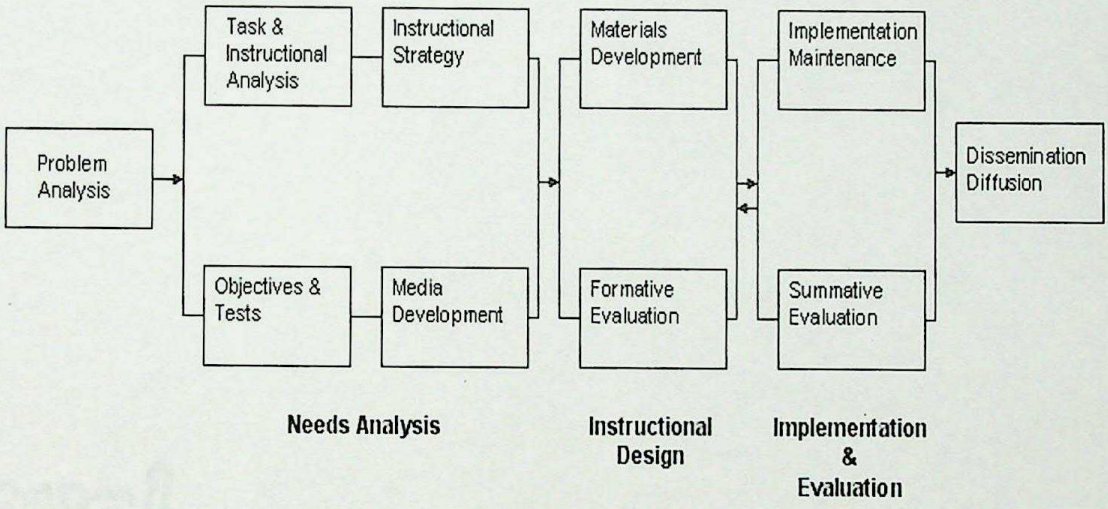


Figure No.2.2: Seels and Glasgow Product-oriented Model

The Seels and Glasgow model consists of three phases:

- Phase I : Need analysis,
- Phase II: Instructional design, and
- Phase III: Implementation and evaluation.

This division allows a project to be planned, resourced, and managed as three phase. The Seels and Glasgow model leads to efficiency in project planning, resource allocation, and the control of the product development cycle while recognizing that instructional designers are often asked to either manage a project or work within an established project management framework.

The **first phase,** needs analysis, includes the establishment of the instructional goals, requirements, and context.

The **second phase**, instructional design, begins after phase one is complete and is made up of six steps: task analysis; instructional analysis; objectives and tests; formative evaluation, materials development, instructional strategy and delivery systems all of which are joined by feedback and interaction.

The **third phase,** implementation and evaluation, includes the development and production of materials, delivery of the training, and summative evaluation.

The steps and phases in this model can be applied in a linear fashion but they are often applied iteratively. In particular, .the steps in the instructional design phase are interdependent and concurrent and may involve iterative cycling. (Gustafson and Branch, 2001).

2.3.2 Use of Seels and Glasgow model for Present Study (S & G Model)

Computer Multimedia Package was developed by the researcher for enabling Teacher-Educators and student-teachers for Constructivist Classroom and The Seels and Glasgow model is based on the constructivist approach to learning. This model places more emphasis on the design of the learning environment rather than on the sequence of the learning. Computer Multimedia Package was developed by the researcher with following objectives.

1. To enable the Student Teachers to understand an active process of constructing rather than acquiring knowledge.
2. To enable the Student Teacher to create teaching and learning activities relevant to Brain based learning for constructing knowledge structures.

Overall the above model facilitates a project to be planned, resourced, and managed in three distinct steps. The S&G model seeks to incorporate efficiency in project planning, resource allocation, and product development control, with the assumption that Instructional designs are often asked to manage a project or work within an established project management framework.

2.3.3 The First Phase: Need Analysis

First phase of S & G model includes the following tasks:

a. Establishment of the instructional goals,
b. Establishment of the requirements, and
c. Establishment of the context.

In this study this need analysis was done by the researcher in the following way:

1. Analysis of preset teacher education porgramme especially the thorough analysis of practice teaching component. This analysis was done by analyzing the NCTE documents, collecting views of Experts and collecting the researchers experiences gained through the research data.
2. Identifying the gaps in traditional teaching and Constructivist teaching. For this detail and thorough reviews of literature and researches were taken particularly in the area of

    i. Cognitive Psychology ii.
    ii. Learning,
    iii. Perception,
    iv. Brain base learning,
    v. Constructivist Teacher Education,
    vi. Brain Compatible Classroom,
    vii. Constructivist Classroom,
    viii. Questioning and Assessment.

3. Interviews of experts working in this field were conducted.
4. Observations of real classroom teaching with constructivist approach in Experimental Schools analysis of activities.
5. Analysis of the cognitive abilities required for Knowledge construction and finalization of the training needs required for developing these abilities among pupils.

After this need analysis the following tasks were completed.

A. Establishment of instructional goals:

The instructional goals are finalized as enlisted- To enable the Student Teachers

1. to acquaint the theoretical and psychological principles of Constructivism.
2. to understand difference between traditional and constructivist teaching tasks.
3. to acquaint with the activities for brain based teaching.
4. to acquaint with collaborative teaching techniques.
5. to apply all the acquainted information in planning for teaching with Constructivism.

B. Establishment of requirements:

The following material and hiring services were finalized:

1. Literature and researches related to Constructivism, Constructivist Classroom, Brain Based Learning, Teacher Education, Learning Designs and Questioning for collection of information.
2. Animated Video Clips of Functions of Brain.
3. PPT of Structure of Human Brain.
4. Experts Working in This Field.
5. Training of some Teacher Educators.
6. Compilation of Audio- Video -Text.
7. Material Development of Multimedia.

C. Establishment of Context:

As the major researches of Constructivist teaching are obtained from abroad, especially from United States. Following contexts related to Indian Education have to be considered:

1. Class Size
2. Teacher- Student
3. Technological Facilities.
4. Work Culture.
5. Gender Specificity.
6. School- Community Relation.
7. Linguistic and other Cultural Contexts.
8. Examination System.

2.3.4 The Second Phase: Instrucational Design

Second phase of S & G model includes the following steps:

a. Task analysis
b. Instructional analysis
c. Objectives and tests
d. Formative evaluation
e. Materials development
f. Delivery systems
g. Feedback and interaction

On the basis of need analysis researcher made list of tasks and any other unique factors involved in or required for development of Computer Multimedia Package which are to be required for giving training to teacher for helping the student to construct their Knowledge and identify the abilities, skills, attitudes and other behavioral aspects required to perform the role of Constructivist teacher. Following prerequisite were decided by the researcher on the basis of need analysis for development of instructional material.

2.3.4.1 Identification of Abilities Required for Knowledge Construction.

After reviewing the literature and researches on Information processing and reading books about Brain based learning, Cognitive Psychology, Educational psychology and Learning Science researcher prepared a list of Components of Knowledge Construction. The list of abilities was given for validation to the experts in the area of Education **(Details of Experts were given in Appendix No. D)** Experts were requested to make descriptive comments and to give suggestions for finalization of abilities. On that basis final list of abilities was prepared by the researcher.

2.3.4.2 Selection of the Target Group

To train the student teacher regarding Constructivist approach it is vital that their teachers i.e. Teacher Educators should be acquainted with Constructivist approach. Hence, the present study requires representative individuals from the strata of student

teacher and teacher Educators of Marathi Medium Colleges of Education (B.Ed.) from Language, Social Science and General Science group.

2.3.4.3 Selection of the Content for Instructional Material Development

As per the need analysis the Constructivism is a type of learning theory that explains human learning as an active attempt to construct meaning in the world around us. The teacher in this process is a co-constructor of knowledge.

It also opens out possibilities for the teacher to participate in the construction of syllabi, textbooks and teaching-learning materials. Such roles demand that teachers be equipped with an adequate understanding of curriculum, subject-content and pedagogy. Hence researcher decided to select content related to Historical roots of Constructivism, Structure and functions of Brain, Brain based learning, Psychological Perspectives of Constructivist Learning, Cooperative Learning and Planning for teaching for Constructivist Learning.

2.3.4.4 Selection of the Learning Strategies for Instructional Material Development

After going through the literature and researches on Constructivism, brain based learning and also after discussing with experts it was understood that use of Constructive approach to teaching and learning in traditional educational set up is not superficial change. Every teacher has to change his/ her attitude, belief and also the behavior pattern from the soul and mind. This change in attitude is as good as giving all the power of teaching, power of classroom to the students keeping faith on them.

This complete change in the mind set up is not only possible through self learning but it will require a good training. Hence it was decided to develop the modules in the language comprehendible to teacher educators so that he/ she will easily explain the concepts to student teachers step by step using small bits.

Hence the learning strategy selected in the module is –

1. Explanation of textual material with the help of lecture supported by PPT slides.

2. Demonstration of Video clips.
3. Listening the interviews of experts in the field.
4. Observing and analyzing lesson planning for constructivist teaching.
5. Observing and analyzing real classroom situations of constructivist teaching.
6. All the material is developed is in English, however, as it is primarily to be used in Maharashtra it was supported by audio in Marathi i.e. bilingual mode was used.

2.3.4.5 Selection of the Media for Instructional Material Development

Multimedia technology is becoming increasingly popular in the field of education. Interactive multimedia courseware in particular, developed on a CD is adding a new and interesting dimension to both teaching and learning. This new approach can effectively complement the conventional methods of learning and teaching. The multi-sensory input of this media provides possibilities for higher performance ratings and higher retention.

With effective feedback, this method makes learning and teaching more meaningful. Students with different learning abilities can work at their own place, time and pace; and with interactivity and self-assessment it can make learning a highly personalized, independent and a rewarding experience.

The learner can also set her/his own .view of the information available to him/her. A significant aspect of multimedia in education is related to authoring or developing multimedia. Multimedia authoring as a form of computing has made it possible for students and teachers to construct knowledge and discover worlds which do not exist in conventional methods of learning or teaching.

In this study researcher wants to combine positive effect of Computer Multimedia with constructivist approach that foster independent learning and awaken love of learning. A resistant student takes his first plunge. A Confused student discovers an elusive principle on her own. Groups of once bored students apply themselves with new found motivation.

2.3.4.6 Nature and Components of Computer Multimedia Package

It is a training package hence it is very Interactive, User friendly and Communicative. The Computer Multimedia consists of Text, PPT, Videos downloaded from You Tube, Interviews of Experts working in this area, Real Classroom shoots related to Constructivist and Co-operative learning teaching. The audio recording in Marathi mother tongue is attached to it.

2.3.4.7 Determination of Components of Module Design

The Computer Multimedia Package was decided to develop in modules after reviewing the related literature and researches in each module there is a provision of Audio recording in Marathi Language, Videos, PPT, references and link related to theme of the module. These modules are structured as follows.

Module No. 1 Constructivism Concept and Meaning.

It contains about Concept of Constructivism, Creating and Sustaining the Constructivist Classroom, Learning in Constructivism, Clarifying Language changes and also contains Checklist for teachers to assessing the Classroom Communication system and Classroom environment with Classroom management and Understanding of motivation.

This module includes Videos regarding of Concept of Knowledge, Learning, and Instruction, Mind regarding Behaviouristic and Constructivist approach and Audio recording of related module in Marathi Language.

Module No. 2 Structure and Functions of Human Brain.

It contains how to be a critical consumer of research on the Brain and Learning, How the Human brain works, and what part of the brain affects learning, recent researches on Understanding, Principles of Brain based Learning, and how Brain based Learning impacts Education, Human Brain Anatomy, Opportunities for Learning, Multiple Intelligence.

This module includes PPT of Structure of Frontal Integrative Brain, Structure of Brain and Audio recording related module in Marathi Language.

Module No. 3 Brain Based Learning

It contains about Emotions and intellect, Principles of Brain based Learning and its implication for teaching, strategies for Brain Compatible classroom, micro skills and habits of mind.

Module also contains PPT regarding Art of teaching, Nervous system development, connecting brain research with Dimensions of Learning, Integrative system and secrets of teenage Brain and Video regarding Action potentials and Synapse formation.

Module No. 4 Psychological Perspectives of Constructivist Learning

It contains about Abilities required for Knowledge Construction and PPT regarding Psychological perspectives given by Jean Piaget, Bruner and Vygotsky regarding Constructivist learning.

Module No. 5 Cooperative Learning

It contains Concept of Cooperative Learning, strategies, tools and methods, benefits, Learning structure and techniques, conditions for effective Collaborative Learning, Six approaches to Co- teaching and PPT of Collaborative teaching Learning.

Module No. 6 Planning for teaching for Constructivist Learning

It contains teaching strategies for Constructivist Learning.

These Strategies are:

i. Investing Learners Previous Experiences

ii. Deductive concept lesson planning template

iii. Inductive concept lesson planning template

iv. Classroom Discussion Methods

- Directed Discussion
- Exploratory Discussion
- Reflective Discussion

Module No. 7 Experts Views on Constructivism

It contains views regarding Constructivism and Constructivist Teaching Learning Process and Evaluation expressed by Ramesh Panase, Wai. Sandhya Hingane, Aksharnandan and Teachers of Lokmanya Tilak Vidyalaya, Chikalgaon (Dapoli) in the form of Recorded Videos.

Module No. 8 Language Lesson

It contains Learning Planning for teaching of Marathi content: Investing Learners Previous Experiences, Deductive concept lesson planning template, Inductive concept lesson planning template, Classroom Discussion Methods: Directed, Exploratory, Reflective

Module No. 9 History Lesson

It contains Learning Planning for teaching of History content: Investing Learners Previous Experiences, Deductive concept lesson planning template, Inductive concept lesson planning template, Classroom Discussion Methods: Directed, Exploratory, Reflective

Module No. 10 Science Lesson

It contains Learning Planning for teaching of science content: Investing Learners Previous Experiences, Deductive concept lesson planning template, Inductive concept lesson planning template, Classroom Discussion Methods: Directed, Exploratory, Reflective.

Module No. 11 Real Classroom Situations

It contains Videos of real Classroom teaching learning situations of Marathi, Science and History Subject content Lessons.

This whole content of multimedia was analyzed in small bits due to which it will become easy to train the student teachers step by step. Hence a modular training

programme was decided to develop. Eleven modules were prepared as shown in the following Table No. 2.3

Table No. 2.3

Name of the Module and nature of Content

Sr. No.	Name of the Module	Nature of Content
1	Constructivism Concept and Meaning	Text, Audio and Videos
2	Structure and Functions of Human Brain.	Text, PPT slides and Audio
3	Brain based Learning	Text, PPT slides, Audio and Videos
4	Psychological Perspectives of Constructivist Learning	Text, PPT slides and Audio
5	Cooperative Learning	Text and Audio
6	Planning for Teaching for Constructivist Learning	Text and Audio
7	Experts views on Constructivism	Videos
8	Language Lesson	Videos
9	History Lesson	Videos
10	Science Lesson	Videos
11	Real Classroom Situations	Videos

2.3.4.8 Preparation of Audio Script of Modules

By considering target group of both English and Marathi medium of Instruction researcher wants to make a summary of prepared modules in Marathi language. So audio scripts regarding Module No. One, Two, Three, Four, Five and Six were prepared by the expert and added as a Hyperlink into the concerned Module. Remaining modules have no any need to make audio recordings because it is mostly in Marathi Videos, Planning and Real classroom situations.

2.3.4.9 Selection of Constructivist Teaching and Learning Strategies

Out of these eleven modules the first six modules are related to theoretical perspective of Constructivism. However, as the aim of this project is to enable the teacher educators and student teachers for teaching in Constructivist classroom. Only the acquisition of theory is not sufficient for this purpose.

Hence, the next task in this project was to develop teaching strategy for Constructivist learning. After reviewing the Literature and researches and also observing the real classroom situations and thinking on them the teaching strategies were finalized. They are described below:

Planning for Teaching to Constructivist Classroom

The Constructivist teaching is altogether different from traditional one. As stated earlier, Constructivist learning assumes that Knowledge is constructed by the learner using the provided sources linking newly learned information to prior knowledge structure. It is also noted by researcher that according to Vygotsky this acquisition of information is geared by Social Learning. Keeping these views in mind the following strategies of teaching were finalized:

- Teaching for activating content related previous knowledge.
- Teaching for clarification and acquisition of concepts included in the textual content.
- Teaching for developing Knowledge Structures using Social cooperative and Collaborative methods.

  I) Investing Learners Previous Experiences

  II) Deductive concept lesson planning template

  III) Inductive concept lesson planning template

  IV) Classroom Discussion Methods:

  i) Directed Discussion

  ii) Exploratory Discussion

  iii) Reflective Discussion

(Ref: Schroeder, M & Gabler, I. (2003). Constructivist Classroom for the Secondary classroom)

2.3.4 .10 Investing Learners Previous Experiences (ILPE)

This method has two goals:

1. To introduce the teacher and to begin to know the students and
2. To discover what the students know about a given topic.

Mostly the teacher employs selective techniques that elicit student ideas. This plan will be used to plan future lessons adjusting to student needs.

ILPE lessons are planned with a number of important goals in mind. First and foremost they are designed to allow the teacher to gain insights into the thinking of your students. What is the nature of their understanding regarding important facts, concepts, and principles related to some new topic? How their experiences impacted their thinking? Addressing these questions is vital for any teacher working from a constructivist learning perspective, and conducting ILPE lesson will allow him/ her to do this directly.

These lessons also allow the teacher to introduce a new topic in an engaging, motivating way. ILPE lessons tend to be highly interactive and fast paced. They also send the message that the teacher truly care about what the students think. Another unmistakable message is that student's questions will influence what subsequently happens in future classes.

The steps of ILPE lesson are as follows:

There is of course no single lesson for selected content. The aim of this teaching is to enable the pupil to prepare a permanent mental model/ Schema of this learnt content in his/ her brain by assimilation or accommodation through individual and social learning. Hence, the teacher has to conduct a series of lessons for selected content. This series is explained in details as below.

I) Hook: Effective Ice breaker- to open with owns thought

In this step a teacher should spend certain specified time to provide an opportunity to orient the students to set of positive expectations that can help for establishing an open

thinker friendly environment. This time may vary from five minutes to a complete period as this step is aimed towards-

i) Establishing learner's mood for the lesson.
ii) Sharing general information about the teacher's purpose.
iii) Conveying something about the nature of lesson.
iv) Modeling the kind of interaction desired from the strengths.

Activities for Hook

Puzzle Reading, Video clips, Films, Demonstration, Cartoon, Poem, Game, Problems, Attention grabbing Questions, Statement, Demonstration, Songs.etc.

II) Student Aim: Focus on Discussion on Specific Topic

A teacher can use these statements differently. Some of forms are as follows:

a) A tentative overview of the content to be explored in the lesson/ Unit.
b) Rationally of the activities to be conducted throughout the lesson.
c) Statements to create curiosity among students by keeping the statements in suspense.

III) Development Phase

Use of Questions- To open windows in students mind.

1. Ask Open ended Questions
2. Brain storming activity
3. Ask questions to full class/ in small group/ written Assignment.
4. Question should be directly connected to personal experiences of students.

Important: Question in ILPE Lesson

i. Should be designed to touch as many aspects of the topic as possible.

ii. Should be planned a brief sequence of open ended trigger question.

iii. Teacher should think two type of follow up questions-

Type of Questions

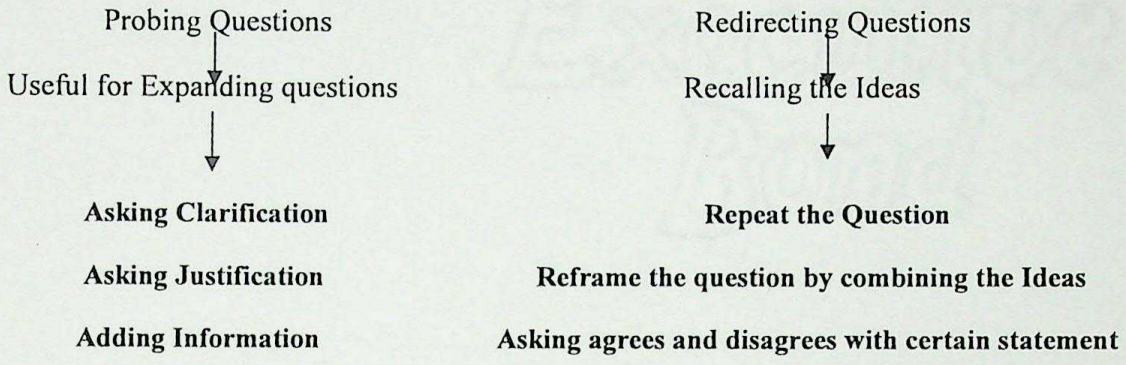


Fig. No. 2.3 Nature of probing and Redirecting Questions

Each student should respond cognitively to the Question

Purpose of this Question is to determine what our students know or don't know about the topic and not for the students to be impressed by teachers Knowledge.

The questions must be answered by the students and not by the Teacher

Don't turn ILPE lesson to the teaching of Topic.

Use wait time for getting answer.

Don't rephrase or redirect question immediately.

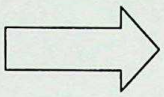
Identify the reason why students are not answering the Question.

List the student gathered ideas on board or chart and arrange these ideas within a Concept map so that a teacher and students can have a Refresher Point.

If questions are not answered ---------- then----------

i. Rephrase it.

ii. Simplify it.

After waiting to A certain Limit  I. Break it into Components.

II. Redirect to another Student

III. Redirect to entire group.

Give Open Ended Activity:

To Check: 1. Established ideas developed by the students.

2. Misconceptions related to the topic

3. Learning style of the students

4. Student- Student interaction

5. Asking questions to each other

Nature of Activity may be-

1. Product oriented

2. Product can be collected, checked and used in later future teaching.

IV. Culmination – Concluding ILPE Lesson

i. Student should prepare summary of what they learnt.

ii. Student should generate number of questions- collect all these question.

iii. Conclude lesson with one minute essay and ask students to generate questions

2.3.4.11 Deductive Concept Method

In this approach, the teacher defines the concept first and provides specific examples and non examples of the concept. The students arrive at classifications by using feature analysis and comparison/ contrast of examples and non examples.

Deductive Concept lessons can serve as engaging alternatives to didactic presentations. Even though most of our educational experiences have been Deductive in nature, the format that we suggest here is highly interactive and intellectually engaging. Lessons like this typically focus on a concept(s) that is big idea within a discipline, an

idea that can be used by the class later to understand events, processes etc. They feature an early presentation of a concept definition by a teacher, followed by the active investigation of a set of examples and the application of the concept to potentially real situations.

Use the Deductive concept method as a lecture alternative, especially when a teacher wishes to challenge students to learn and apply a central concept or principle that might be utilized in future lessons. There are several keys for effectively planning such a lesson.

- Think carefully about how you might define the central concepts.
- Use the guiding questions posed earlier to help you through this process.
- Consider how you might share examples (and possibly non examples) of the concept.
- Whether you will do this in a full class or small group settings.
- As in any lesson, write your main trigger questions into your lesson plan.

This will help any teacher challenge students to carefully investigate the examples and to think deeply about why concept is important. Finally, challenge students to apply the concept during the final phases of the lesson and in future lessons.

Step One: Selecting a Concept

1. What is the name most commonly associated with your concept(s)?
2. What is the concept's rule or definition?
3. What are the critical attributes (i.e., essential characteristics) of the concept?
4. What are some of the noncritical attributes (i.e., nonessential features) associated with the concept?
5. What are some interesting, learner-relevant examples or cases of the concept that can be used during the lesson?
6. What are some contrasting non examples (if any) that will help illustrate the concept?

7. What are the most interesting, efficient, and thought-provoking media that might be used to illustrate the concept?

Step Two: Planning the Lesson

Now add the details to complete your lesson plan. Think about what you might say/ do/ask during each phase of the lesson. Refer to the following template to remind yourself of the core components and method markers.

Prelude *(for teacher reference)*

- Rationale (with connection to national/state standards)
- Performance Objective
- Materials and Lesson Aids

Enactment *(student engagement)*

- Hook
- Student Aim
- Concept definition
- Development
- Investigation of examples and non examples.
- Application of the concept to new/problematic situations.
- Culmination
  - Wrap-Up: What did the students learn?
  - Leap: How will they use these important ideas?

Assessment and evaluation

- What will students produce to show you what they've learned?
- How will you evaluate this product?

2.3.4.12 Inductive Concept Method

One or more concepts are taught inductively. The format is the reverse of the deductive format. You provide examples and non examples of a concept. With questions, (not teacher talk), you lead students to a conceptual understanding, which includes student generation of the concept. (Specific to general).

Inductive lessons challenge students to investigate examples and non examples of a concept or principle, to analyze their similarities and differences, and ultimately to discover the main idea and articulate and test a definition for it. We consider the inductive method to be a quintessential part of a constructivist classroom.

In effect you are challenging your students to become historians, linguists, scientists, mathematicians and so on, as they directly experience concept examples and develop and utilize critical thinking abilities to make sense of complex situations. Inductive lessons provide students with excellent practice in developing reasoning patterns, presenting and defending clear statements of positions, and listening to and challenging the ideas of others. Frequent use of inductive method can have an intellectually invigorating, empowering effect on students.

Step One: Selecting a Concept

1. What is the name most commonly associated with your concept(s)?
2. What is the concept's rule or definition?
3. What are the critical attributes (i.e., essential characteristics) of the concept?
4. What are some of the noncritical attributes (i.e., nonessential features) associated with the concept?
5. What are some interesting, learner-relevant examples or cases of the concept that can be used during the lesson?
6. What are some contrasting non examples (if any) that will help illustrate the concept?
7. What are the most interesting, efficient, and thought-provoking media that might be used to illustrate the concept?

Step Two: Planning the Lesson

Now add the details to complete your lesson plan. Think about what you might say/ do/ask during each phase of the lesson. Refer to the following template to remind yourself of the core components and method markers.

PRELUDE (for teacher reference)

- Rationale (with connection to national/state standards)
- Performance Objective

- Materials and Lesson Aids

ENACTMENT (student engagement)

- Hook (consider possible introduction of examples)
- Student Aim (open ended)
- Development
- Investigation of examples and non examples
- Discovery of the concept
- Application of the concept
- Culmination
- Wrap-Up: What did the students learn?
- Leap: How will they use these important ideas?
- Assessment and Evaluation
- What will students produce to show you what they've learned?
- How will you evaluate this product?

Assessment and Evaluation

- What assessment products will your students generate?
- What criteria will you use in your evaluation rubric?

For these lessons teacher has to analyze content for selecting the concepts. Analyze and list the concepts. Identify whether the pupils have attained these concepts or not. And then proceed. In languages there may not be concepts but these are main points, phrases, linguistic structures and themes. Use these steps for learning it. It helps students to understand the content and central idea of the content quite meaningfully.

Constructivist classroom are both active and interactive places. In describing a number of techniques and methods, constructivist teachers place great emphasis on what we might call classroom discourse, which is the respectful and purposeful exchange of ideas between teachers and students and among the student themselves. Such discourse is the focus in classroom situations.

After confirmation of attainment of each and every concept/ points included in the content proceeds towards discussion part.

Discussion as the verbal investigation or consideration of questions by a group of people.

Three types of discussion should be arranged in Constructive Classroom.

I. Directed Discussion.

II. Exploratory discussion.

III. Reflective Discussion.

2.3.4 .13Planning and Conducting a Directed Discussion

Teacher student interaction is emphasized here. Your series of questions related to material facilitate student's grasps of one or more principles. The teacher role is more dominant in this discussion than in the two subsequent discussion methods.

Directed Discussions can last from a few minutes to about one-half hour, depending on a number of factors Directed Discussions are highly interactive and can be among the most engaging of constructivist teaching methods.

The teacher-student interaction pattern will allow you as the facilitator to ask literally dozens of challenging questions that can involve each student in the classroom focusing closely on since it is too broad and calls for students to make value-oriented decisions in choosing the main causes for the war. We'll see that such a question would be better suited for a Reflective Discussion, since it allows for greater student freedom to make and defend decisions based on individual beliefs.

Keys for Conducting Effective Directed Discussions.

Obviously, an interesting topic and an engaging structuring device are vital.

1. Plan the structuring device and secondary questions carefully.
2. Make these questions thought provoking without being leading; as in each of the constructivist methods.
3. The ultimate goal will be to challenge the students to do the thinking rather than you as the teacher providing them with bits of information.
4. Also consider the earlier recommendations for effectively questioning students;

This type of discussion is as interactive as any method you'll ever use and asking thought-provoking questions and encouraging interaction will be crucial. Be patient when conducting the first classroom discussions.

2.3.4.14 Exploratory Discussion Method

Exploratory Discussions are exceptionally student centered; teacher should allow the students wide discretion in deciding how they'll respond to the structuring question.

In these discussions, the teacher plays a facilitative role, asking occasional secondary, probing, and redirecting questions. Teacher is main task as facilitator will be to ensure that the main question is "explored" in terms of both breadth and depth and that the discussion engages as many students as possible.

Plan a broad, inviting structuring device and possible secondary questions that might be asked at some point in the discussion. Be patient. It may take a few minutes for the discussion to get rolling, but the interaction will usually take off if a teacher extend wait time and encourage the group. The right seating arrangement can help.

Purpose of Exploratory Discussion Method

1. The ultimate goal in most Exploratory Discussions is for students to identify alternatives in responding to the main, structuring question.
2. The purpose of Exploratory Discussion is to allow students to brainstorm alternatives, implications, pros/ cons, or other ideas in response to an open-ended structuring device.

Through promotion of Teacher student interaction, this discussion allows the class to examine different perspectives of one concept or controversial issue. Students do not arrive at a value judgment. Rather they explore different points of view based on documentation. This student centered method that may include Role- play. The teacher's role is to ask broad questions to steer the discussion if necessary. It is a prime example of invisible teaching.

An Exploratory Discussion might be used to identify alternate methods for solving a problem, explaining an event, or interpreting a piece of literature or artwork. Exploratory Discussions differ from the other two types in that no true resolution to the

structuring question is necessary; the list of pros and cons, alternatives, implications, or ideas/suggestions is considered the resolution.

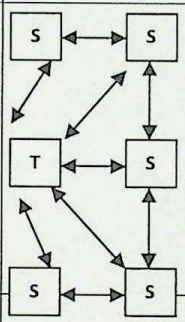
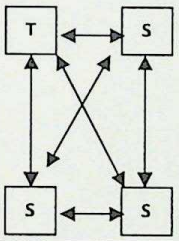
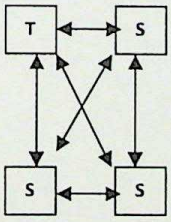
These discussions are often used to begin a series of lessons or to challenge students to apply new ideas after a series of classroom experiences. As we will see, Exploratory provide teachers with a valuable tool for gaining insights into student experiences related to a new topic and for connecting elements within the topic to events relevant in students' lives.

2.3.4.15 Reflective Discussions Method

Reflective share with Directed Discussions the characteristics of having a convergent, focused structuring question and a specific resolution to the question posed. They are similar to Exploratory Discussions in the degree of freedom that you'll afford your students over the flow of the interaction, even though the interaction is more focused. In Reflective Discussions, students are given opportunities to find ways to address academic problems and to make their own decisions rather than being guided by the teacher through the process step by step, as in Directed Discussions.

Table No.2.4

Classroom Discussion Methods

Discussion Type	Nature of Discussion	Teacher Preparation	Nature of Structuring Device	Interaction Pattern	Role of students	Role of teacher
Directed	Structured investigation analysis of a focused questions somewhat predator mined by teacher.	Lists points to rise and writes question designed to help student understand each point.	Highly focused, provides a direction for interaction		Reach new levels of understanding by responding to focused question.	Guide: Poses a series of focused question that help students reach new insights. Ask frequent Probes/ Redirects
Exploratory	Brainstorming investigation of 1.Alternatives 2.Pros and cons 3.Implications decisions made by students	Plans open-ended questions by anticipating possible areas of student response.	Extremely broad open ended designed to include peripheral topics. Alternative explanations .		Free thinkers: generate ideas and new questions in an open setting.	Moderator: sets initial direction, asks occasion- all trigger, probe, and redirected questions.
Reflective	Decision making: Investigation of a value based questions	Plans potential questions based on implications / issues connected to main questions.	Somewhat focused: challenge students to make/ defend a best decision.		Decision Makers: struggle with debating a question that has no right answer.	Moderator: aides flow of discussion, challenges students to justify/ support decisions.

(Ref: Schroeder, M & Gabler, I. (2003). Constructivist Classroom for the Secondary Classroom)

There are no absolute boundaries between them; much will depend on question and ideas that teacher and students are spontaneously generate.

2.3.5 The Third Phase: Implementation and Evaluation

2.3.5.1 Preliminary Part

Preliminary parts contains preface, index etc.

First draft writing process consists following tasks.

- Preparing detail outline of package.

- Searching the source of information regarding the points of outline.
- Identification and selection of appropriate information.
- Editing and organization of information for each module of the package.

The above said processes are described in brief.

2.3.5.2 Preparation of Detail Outline of Package

Part wise detail outlines have been prepared by researcher. These outlines are discussed with experts and finalized for searching and collecting information.

2.3.5.3 Searching Information

Information regarding Historical roots of Constructivism, Structure and functions of Brain, Brain based learning, Psychological Perspectives of Constructivist Learning, Cooperative Learning and Planning for teaching for Constructivist Learning is searched from electronic as well as print sources. Various encyclopedias and reference books have been referred to collect the information.

2.3.5.4 Identification and Selection of Appropriate Information

The information is selected in relevance of objectives of package. It is identified as essential to package on the basis of following criteria –

i) Validity,
ii) Authenticity,
iii) Relevance
iv) Research base
v) Accuracy, etc.

The List of books, websites, researches for searching information, PPT, Videos, Experimental schools, teachers and experts working in this area is given below in the Table No.2.5

Table No.2.5

Name of Books and Authors

Sr. No.	Name of Books	Name of Authors
01	The training of teachers for affective roles.	Brown, G. S. (1975).
02	The active mentor.	Burke, Kay. (2010).
03	Brain Compatible Classroom.	Fogarty, R. (2009).
04	Constructivist Learning Design	Gagnong, G & Collay, M. (2006).
05	Bringing your Learning Community to Life	Headley, Linda & Kaagan,Stephen.(2010).
06	Designing and Assessing Education Objectives.	Marzano, Robert & Kendall, John.(2008)
07	Learning How to Learn.	Novak, J. (1984).
08	Curriculum framework for quality teacher education.	NCTE (2004).
09	Creating and sustaining the Constructivist Classroom	Page,Marilyn & Marlowe, Bruce.(2005).
10	Leading through Quality Questioning.	Sattes,Beth & Walsh, Jackle. (2010).
11	Teaching Practice: Lesson Planning.	Singh, Yogesh. (2003).
12	Training teachers : Problems and issues	Singh, R. P. (2006).
13	Constructivist Classroom for the Secondary classroom: engaged minds.	Schroeder, M & Gabler, I. (2003).
14	We are born to Learn	Smilkstein, Rita. (2003).
15	Taxonomy for learning teaching and assessing:	Wittrock, M, Krathol,D & Anderson, L.(2001).
16	Training technology programme	Wilson, Bob (1987).

Table No.2.6

Title of PPTs and Name of Authors

Sr. No.	Title of PPT	Name of author
01	Part I. Collaborative and Cooperative Learning: The Basics	Curtis J. Bonk, Professor, Indian University President, Survey Share
03	Connecting Brain research with dimensions of Learning	Steven Varrassi
04	The Nervous System: The Brain	Benjamin Cummings: Pearson Education
05	Adolescent Brain Development	Barbara Sullivan
06	Jerome Bruner	Azman Omar
07	Anatomy and Physiology: From Science to Life	John, Wiley and Sons
08	The Art of Changing the Brain: Enriching Teaching by Exploring the Biology of Learning	James. E. Zull
09	Secretes of Teenage Brain	Sheryl Feinstein
10	How Your Brain Learns	Victoria Gallagher

BARR. BALASAHEB KHARDEKAR LIBRARY
SHIVAJI UNIVERSITY, KOLHAPUR.

Table No.2.7

Address of Websites

Sr. No.	Name of Websites
01	www.edtech.kennesaw.edu
02	www.calstatela.edu
03	www.amazon.com
04	action potentials.mpeg
05	by discoverychannel.mpeg
06	www.havtech3d.com
07	interactive 3d Brain.mpeg
08	synapseanimation.mpeg
09	www.lifecirclesinc.com
10	constructivist-education.blogspot.com
11	constructivism.wordpress.com
12	www.coe.uga.edu

Table No.2.8

Name of Experts

Sr. No.	Name of Experts
01	Dr. A. N. Joshi
02	Shri. Ramesh Panase
03	Dr. V.S. Deshpande
04	Dr. Chitra Sohani
05	Dr. Suman KArandikar
06	Dr. Sheela Koltakar
07	Suchita Padalkar
08	Mr. Dandekar
09	Dr. Rajashri Bam

Table No.2.9

Name of Teachers

Sr. No.	Name of Teachers
01	Teachers of Srujananda, Kolhapur
02	Teachers of Aksharnandan, Pune
03	Teachers of Bharat Vidyalaya, Shahabag (Wai)
04	Teachers of Kuditre (Karveer)

Table No.2.10

Name of Experimental Schools

Sr. No.	Name of Experimental Schools
01	Srujananda, Kolhapur
02	Aksharnandan, Pune
03	Bharat Vidyalaya, Shahabag (Wai)

2.3.5.5 Editing and Organization of Information

The information is accessed from diversified sources. Originally this information is presented in different contexts. Therefore, its editing regarding objectives of package was essential. It was essential to organize that information in a homogenous manner.

Editing involves summarizing, rewriting or reshaping the information. Researcher has written that information in simple language and organized in systematic matter. Various studies related to package development and their packages has been referred by researcher.

2.3.5 .6 Evaluation and Revision

This phase consists of i) Pilot Study, ii) Discussion of observations of pilot study. Both the facts of the phase are given in details as follows:

2.3.5.7 Pilot Study

Researcher conducted pilot study in Kuditre Tal- Karveer Dist- Kolhapur Maharashtra on 27th and 28th Nov.2011.and 2nd Dec. 2011This school was purposively selected for pilot study because the teachers in this school have been trained in constructivism by state Government of Maharashtra.

Researcher has employed the Computer Multimedia package with the help Two Ph. D students who were doing their Ph.D. in Constructivism with the purpose of investigation of –

1. Comprehensiveness of terminology and instructions
2. Variables affecting experimentation
3. Time required for training.
4. Practicability of activities.

Training was provided to all the teachers in this school as follows:

1. Researcher conducted three days training programme on school teacher for Constructivist teaching using the selected modules.
2. Two Ph.D. students were conducted i.e. Investigating Learners Previous Knowledge for Marathi and History subject on IX standard pupils.
3. The problems, difficulties faced by the researcher regarding training were investigated through informal discussion with the Experts.

The modules selected for pilot testing were:

i. Module No.1 Constructivism Concept and Meaning.
ii. Module No. 5 Cooperative Learning
iii. Module No. 6 Planning for teaching for Constructivist Learning

The following observations were recorded during Pilot Study-

i. The teacher educators and teachers have accustomed to Behaviorist Approach to education which is reflected in their communication pattern, teacher student relationship and formal taking pattern.
ii. All the resources collected were used one after another and all the learning activities were organized.

iii. The framing pattern of questions, delivering of questions and accepting the response was improper.
iv. Major emphasis was given on individual activity and not on group activity.
v. Number of higher level thought provoking questions was very less.
vi. The teachers were unable to arrange focused reading and also the writing activities neatly.
vii. Handouts were not prepared and used for noting the observations while looking the Video clips.
viii. The teacher has not allotted sufficient time to students for oral expressions.
ix. The teachers were not performing the role as facilitators satisfactorily.
x. The teachers were not fluently expressing their thoughts.
xi. The language used by teachers in the classroom was not student friendly.

2.3.5.8 Modification in the Package

Discussion with Experts

The results of pilot study have been communicated with experts and probable measures for improvement were discussed and final form of Computer Multimedia package was prepared.

The following modifications were done in Package:

i. Information related to Communication, Principles of Constructivist and brain based teaching and a change to be made in self was added.
ii. Material related to learning designs and Learning Environment was added.
iii. Material related to questioning was prepared and added.
iv. PPT s of Collaborative teaching was prepared.
v. Training was rescheduled for organizing activities.

Final Form of Package

The package has been characterized through a long process from defining the objective, components etc. to pilot study. The each phase of development has contributed

it to enrich in both dimension quality and practicability. Through this process it came to final form as given in the Table No. 2.5

Table no. 2.11

Final Format of Computer Multimedia Package

Sr. No.	Number the Module	Name of the Module
1	Module No. 1	Constructivism Concept and Meaning
2	Module No. 2.	Structure and functions of Human Brain.
3	Module No. 3	Brain based Learning
4	Module No. 4	Psychological Perspectives of Constructivist Learning
5	Module No. 5	Cooperative Learning
6	Module No. 6	Planning for teaching for Constructivist Learning
7	Module No. 7	Experts views on Constructivism
8	Module No. 8	Language Lesson
9	Module No. 9	History Lesson
10	Module No. 10	Science Lesson
11	Module No. 11	Real Classroom Situations

2.3.5.9 Evaluation of Computer Multimedia Package

The package was given for examination to the experts in the area of Education and Technology examined this package with the Check List provided by researcher. It was a two point's scale structured as follows

Table No. 2.12

Statements of Checklists for Evaluation of Package

Sr. No.	Components	Sub Components
1	Instructional Content	Information is accurate, complete, and current and accurately represents the topic.
		Content of CMP is presented clearly (Text, Pictures, Graphics, Auditory and Videos information)
		Facts are come from reliable sources which are clearly identified.
		Content and Context are consistent with the theme.
		Content moves learners beyond the basics and encourages higher level of thinking.
		Content engaged the students in applying what they learn
2	Screen Elements	Titles, text areas and navigation buttons are easy to understand and Operate.
3	Multimedia Graphics	Background and text are pleasing, compatible and easy to read.
		Graphics are Consistent, appropriate and designed to optimize learning.
		Colors and Color scheme are used in an effective way.
		Animation and Videos are attractive, meaningful and Complimentary to learning
4	Technical Aspects	All links work properly.
		Clear and Complete directions are available for access or installation.

		Users are able to access CMP with ease.
5	**Accessibility**	Hyperlinks are clear.
		Paragraphs and sections have clear and accurate information headings.
6	**Teacher and Learner Support Material**	Provides various ways to reach technical support.
		During the use of CMP, there was evidence of learning gains. It supplies information to teacher and students on how it measures student learning.
		CMP provides additional sources such as Bibliographies which are suitable to Constructivist approach.
7	**Age Appropriateness**	Reading level is appropriate for target audience.
		Product is suitable for the age.
		Directions are clear and complete enough for students to performed required task.

The package was given for examination to the experts in the area of Education and Technology examined this package with the help of Check List. Evaluation of CMP was made by six experts. According to Experts:

1. Most of the expert (05) noted that Instructional content of Package is Appropriate.
2. The entire expert (06) noted that a Screen element of Package is Appropriate.
3. The entire expert (06) noted that Multimedia Graphics of Package is Appropriate.

4. Most of the experts (04) noted that a Technical aspect of Package is Appropriate.
5. The entire experts (06) noted that Accessibility of Package is Appropriate.
6. All experts (06) noted that Teacher and Learning material of Package is Appropriate.
7. All experts (06) noted that Instructional content of Package is Age Appropriate.

Thus with the help of **Seels and Glasgow model** Researcher developed Computer Multimedia Package for enhancing Constructivist approach among Student Teachers and Teacher Educators.

2.4 Training to the Student Teachers

After preparing the final draft of the Computer Multimedia Package was ready for giving training to the target group of Teacher Trainees.

Training was given to student Teachers and Teacher Educators related to Marathi, Science and History method of college of Education from Karad District and College of Education. (B. Ed.) from Kolhapur district.

Training was given for one month including one hour per day. Module wise training was conducted on target group. Separate training was provided to Teacher Educators of related subject methodology and to the student teacher.

The training programme was developed in the light of following objectives.

2.4.1 Objectives of Training

To enable the student teachers to-

1. understand the basic difference between Conventional Classroom practices and Constructivist Classroom practices.
2. understand concept of Knowledge Construction.
3. understand the abilities required for Knowledge Construction.
4. understand and apply the Brain based Learning for preparing constructivist Classroom.
5. understand the psychological perspectives of constructivist approach.

6. understand and apply the learning strategies for constructivist Classroom.
7. acquaint with the Planning for teaching to the Constructivist Classroom.
8. acquaint the role of teacher and students in Constructivist approach.

Following Table No. 2.13 shows the details of the training conducted in the college of Education, Karad, Dist Satara (Maharashtra) and Table No. 2.14 shows the details of the training conducted in the college of Education, Gargoti , Dist Kolhapur (Maharashtra)

Table No.2.13

Nature of Task/ Strategies and Time Duration of Training at Karad

Day	Nature of Task		Strategies	Date	Duration
	Module	Task done by researcher			
Day 1	Constructivism : Concepts and Nature	Explanation of the purpose of the training. Motivation of student teacher for sharing individual experience on Knowledge Construction.	Interactive Lecture Discussion Concept Mapping	12-1-2012	1 Hour
Day 2	Constructivism : Concepts and Nature	Explanation of what exactly Constructivism, Creating and Sustaining the Constructivist Classroom is. Learning in Constructivism, Clarifying changes in use of Language classroom m.	Interactive Lecture Discussion Individual Activity Peer activity Directed Discussion Concept mapping	13-1-2012	2 ½ Hours
	Constructivism : Concepts and Nature	Assessing Communication System with Learning Environment.	Individual activity. Discussion		

Day	Nature of Task		Strategies	Date	Duration
	Module	Task done by researcher			
Day 3	Structure and Functions of the Brain.	How to be a Critical Consumer of research on the Brain and Learning	Discussion Interactive Lecture with PPT	14-1-2012	2 Hours
Day 4	Structure and Functions of the Brain..	How the brain works, and what part of the brain affects learning,. How Brain based Learning impacts Education	Group Discussion. Interactive Lecture with PPT.	15-1-2012	2 Hours
Day 5	Structure and Functions of the Brain.	Human Brain Anatomy Opportunities for Learning Activities to teach Peripheral and Central parts of the Brain	Interactive Lecture Discussion Individual Activity	16-1-2012	2 Hours
Day 6	Brain Based Learning	Emotions and Intellect,	Discussion Group Activity	17-1-2012	1 Hour
Day 7	Brain Based Learning	Principles of Brain Based Learning and its implication for teaching, Strategies for Brain Compatible classroom	Discussion Group Activity	18-1-2012	2 Hours
Day 8	Brain Based Learning	PPT regarding Art of Teaching	Interactive Lecture Discussion Group activity	19-1-2012	1 Hour

Day	Nature of Task		Nature of Task	Date	Duration
	Module	Task done by researcher			
Day 9	Brain Based Learning	PPT regarding Nervous system development,	Interactive Lecture Discussion Group Activity	20-1-2012	1 Hour
Day 10	Brain Based Learning	PPT regarding connecting brain research with Dimensions of Learning	Interactive Lecture Discussion Group Activity	21-1-2012	1 Hour
Day 11	Brain Based Learning	PPT regarding Integrative system and secrets of teenage Brain	Interactive Lecture Discussion Group Activity	22-1-2012	1 Hour
Day 12	Brain based Learning	Video regarding Action potentials and Synapse formation.	Interactive Lecture Discussion Group Activity	23-1-2012	1 Hour
Day 13	Psychological Perspectives of Constructivist Learning	Abilities required for Knowledge Construction.	Interactive Lecture Discussion Group Activity Individual Activity	24-1-2012	1 Hour
Day 14	Psychological Perspectives of Constructivist Learning	PPT regarding Psychological perspectives of Jean Piaget, Bruner and Vygotsky regarding Constructivist learning	Interactive Lecture Discussion Group Activity	25-1-2012	2 Hours

Day	Nature of Task		Nature of Task	Date	Duration
	Module	Task done by researcher			
Day 15	Collaborative Learning	Concept of Cooperative Learning, Tools and Methods, Benefits of Cooperative Learning	Interactive Lecture Discussion Group Activity	26-1-2012	1 Hour
Day 16	Experts views on Constructivism	Ramesh Panase Sandhya Hingagne	Group Discussion Individual Activity	27-1-2012	2 Hours
Day 17	Theory Evaluation Checklist	Evaluation	Administration of Test	28-1-2012	1 Hour
Day 18	Planning For Teaching for Constructivist Learning	Investing Learners Previous Experiences	Group Discussion Group Activity Individual Activity	29-1-2012	2 Hours
Day 19	Planning For Teaching for Constructivist Learning	Deductive Concept Lesson Planning	Group Discussion Group Activity Individual Activity	30-1-2012	2 Hours
Day 20	Planning For Teaching for Constructivist Learning	Inductive Concept lesson Planning	Group Discussion Group Activity Individual Activity	31-1-2012	2 Hours
Day 21	Planning For Teaching for Constructivist Learning	Discussion method Directed Exploratory Reflective	Group Discussion Group Activity Individual Activity	1-2-2012	2 Hour

Day	Nature of Task		Nature of Task	Date	Duration
	Module	Task done by researcher			
Day 22	Lesson Planning	Marathi	Individual Activity Group Activity	2-2-2012	2 Hours
Day 23	Lesson Planning	Science	Individual Activity Group Activity	3-2-2012	2 Hours
Day 24	Lesson planning	History	Individual Activity Group Activity	4-2-2012	2 Hour
Day 25	Plan Evaluation Checklist	Evaluation	Administration of Test	5-2-2012	1 Hour
Day 26	Real Classroom Situations	Marathi	Discussion Interactive Lecture Group Activity Simulation	6-2-2012	3 Hours
Day 27	Real Classroom Situations	Science	Discussion Interactive Lecture Group Activity Simulation	7-2-2012	3 Hours
Day 28	Real Classroom Situations	History	Discussion Interactive Lecture Group Activity Simulation	8-2-2012	3 Hours

Table No.2.14

Nature of task, Strategies and Time Duration of Training at Gargoti

Day	Nature of Task		Strategies	Date	Duration
	Module	Task done by researcher			
Day 1	Constructivism : Concepts and Nature	Explain the purpose of the training. Motivate teacher trainees for sharing individual experience on Knowledge Construction.	Interactive Lecture Discussion Concept Mapping	27-2-2012	1 Hour
Day 2	Constructivism : Concepts and Nature Constructivism: Concepts and Nature	Explains what exactly is Constructivism, Creating and Sustaining the Constructivist Classroom. Learning in Constructivism, Clarifying Language changes. Assessing Communication system with Learning Environment.	Interactive Lecture Discussion Individual Activity Peer Activity Directed Discussion Concept Mapping Individual Activity. Discussion	28-2-2012	2 ½ Hours
Day 3	Structure and Functions of the Brain.	How to be a critical consumer of research on the Brain and Learning	Discussion Interactive Lecture with PPT	29-2-2012	Hours
Day 4	Structure and Functions of the Brain..	How the brain works, and what part of the brain affects learning,. How Brain based Learning impacts Education	Group Discussion. Interactive Lecture with PPT.	1-3-2012	2 Hour

Day	Nature of Task		Strategies	Date	Duration
	Module	Task done by researcher			
Day 5	Structure and Functions of the Brain.	Human Brain Anatomy Opportunities for Learning Activities to teach Peripheral and Central parts of the Brain	Interactive Lecture Discussion Individual Activity	2-3-2012	2 Hours
Day 6	Brain based Learning	Emotions and intellect,	Discussion Group Activity	4-13.2012	1 Hour
Day 7	Brain based Learning	Principles of Brain based Learning and its implication for teaching, Strategies for Brain Compatible classroom	Discussion Group Activity	5-3-2012	2 Hours
Day 8	Brain based Learning	PPT regarding Art of Teaching	Interactive Lecture Discussion Group Activity	6-3-2012	1 Hour
Day 9	Brain based Learning	PPT regarding Nervous System Development,	Interactive Lecture Discussion Group Activity	7-3-2012	1 Hour
Day 10	Brain based Learning	PPT regarding Connecting brain research with Dimensions of Learning	Interactive Lecture Discussion Group Activity	8-3-2012	1 Hour

Day	Nature of Task		Strategies	Date	Duration
	Module	Task done by researcher			
Day 11	Brain based Learning	PPT regarding Integrative system and Secrets of teenage Brain	Interactive Lecture Discussion Group Activity	9-3-2012	1 Hour
Day 12	Brain based Learning	Video regarding Action Potentials and Synapse formation.	Interactive Lecture Discussion Group Activity	10-3-2012	1 Hour
Day 13	Psychological Perspectives of Constructivist Learning	Abilities required for Knowledge Construction.	Interactive Lecture Discussion Group Activity Individual Activity	11-3-2012	1 Hour
Day 14	Psychological Perspectives of Constructivist Learning	PPT regarding Psychological Perspectives of Jean Piaget, Bruner and Vygotsky regarding Constructivist Learning	Interactive Lecture Discussion Group Activity	12-3-2012	2 Hours
Day 15	Collaborative Learning	Concept of Cooperative Learning, tools and methods, benefits of Cooperative learning	Interactive Lecture Discussion Group Activity	13-3-2012	1 Hour
Day 16	Experts views on Constructivism	Ramesh Panase Sandhya Hingagne	Group Discussion Individual Activity	14-3-2012	2 Hours
Day 17	Theory Evaluation Checklist	Evaluation	Administration of Test	15-3-2012	1 Hour
Day 18	Planning for teaching for Constructivist Learning	Investing Learners Previous Experiences	Group Discussion Group Activity Individual Activity	16-3-2012	2 Hours

Day	Nature of Task		Strategies	Date	Duration
	Module	Task done by researcher			
Day 19	Planning for teaching for Constructivist Learning	Deductive Concept Lesson Planning	Group Discussion Group Activity Individual Activity	17-3-2012	2 Hours
Day 20	Planning for teaching for Constructivist Learning	Inductive Concept Lesson Planning	Group Discussion Group Activity Individual Activity	18-3-2012	2 Hours
Day 21	Planning for teaching for Constructivist Learning	Discussion method Directed Exploratory Reflective	Group Discussion Group Activity Individual Activity	19-3-2012	2 Hours
Day 22	Lesson Planning	Marathi	Individual Activity Group Activity	20-3-2012	2 Hours
Day 23	Lesson Planning	Science	Individual Activity Group Activity	21-3-2012	2 Hours
Day 24	Lesson Planning	History	Individual Activity Group Activity	22-3-2012	2 Hours
Day 25	Plan Evaluation Checklist	Evaluation	Administration of Test	23-3-2012	1 Hour
Day 26	Real Classroom Situations	Marathi	Discussion Interactive Lecture Group Activity Simulation	24-3-2012	3 Hours

Day	Nature of Task		Strategies	Date	Duration
	Module	Task done by researcher			
Day 27	Real Classroom Situations	Science	Discussion Interactive Lecture Group Activity Simulation	25-3-2012	3 Hours
Day 28	Real Classroom Situations	History	Discussion Interactive Lecture Group Activity Simulation	26-3-2012	3 Hours