Chapter III

Methodology of the Study

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3.0. Introduction

This chapter presents the plan and procedure for the present study. Experimental Design of the study, population, sample, sources of data, different tools & techniques used, development of orientation programme and intervention programme. Followed by the data collection procedure and analysis techniques used in the present study have been presented.

3.1. Design of the Study

It was an intervention study at the B. Ed. Level. Time Series Design, i.e. one group was repeatedly pretested until pre-test scores were stable, then the group was exposed to the treatment and after the treatment Post tested, repeatedly.

O_1 O_2 X O_3 O_4

O_1, O_2 are Pre-tests

O_3, O_4 are Post-tests

O_1 → Initial Pre-test

O_2 →Pre-test after 10 days of O_1

X → Treatment

O_3→ Post-test after treatment

O_4 →Post-test after 10 days of O_3

The post-test was same as the pre-test.

3.2. Population of the Study

The present study was conducted in Gujarat state. There are total 9 Departments of Education and colleges of Education where the medium of instruction is English. Among these 9 Departments of Education and Colleges of Education 2are only offering English as a method of teaching. So,the rest of the Departments of Education

and Colleges of Education which are offering Science as method of teaching comprise the Population for the present study.

3.3. Sample of the Study

For the present study one English medium B.Ed. College was selected randomly. All the student teachers having science method of the selected college of Education comprised the sample. Thus, sampling technique was cluster sampling. For the present study Navrachana School of Science & Education, Vadodara was selected as the sample. All the student teachers of academic year 2013-2014 having science method as one of the teaching methods, constituted the sample. Eighteen of the student teachers who opted for teaching of science as one method constituted the sample for the present study.Replication of the study was done in academic year 2014 – 2015 on student teachers of Waymade College of Education, Vallabh Vidhyanagar.All the student teachers of academic year 2014-2015 having Science method as one of the teaching methods constituted the sample. 49 student teachers opted for teaching of science as one of the methods. On the first day of administration of pre test 21 students were present. All of them constituted the sample for the present study.

3.4. Plan and Procedure of the Study

Phase I: Pre Intervention (Administration of Pre-tests)

1. Knowledge and Skill Check up (**KSC1**) was administered on the Student Teachers of the Experimental Group as Pre-test.
2. Story and Crossword Puzzle (**SC1**) were administered on the Student Teachers of Experiment Group as Pre-test.
3. Knowledge and Skill Check up (**KSC2**) was administered on the Student Teachers of Experiment Group after 10 days of KSC1 as Pre-test.
4. Story and Crossword Puzzle (**SC2**) were administered on the Student Teachers of Experiment Group after 10 days of SC1 as Pre-test.

Phase II: Intervention Programme

1. Group Discussion was conducted by the researcher with Student Teacher of the Experimental group on present reforms in curriculum & its transaction, evaluation and their impact on Science Teaching.
2. Orientation on Wholistic Approach to Science Teaching was given to Student teachers of the Experimental Group by the researcher.
3. The lesson plans prepared through Wholistic Approach to Science Teaching were implemented in Experiment Group by the researcher.
4. Student Teachers were asked to design and implement two lesson plans through Wholistic approach to Science Teaching. These lesson plans were checked by the researcher.

Phase III: During Practice Teaching Phase

1. The Experiment Group Student Teachers had implemented designed lesson plans prepared through Wholistic approach to Science Teaching in school during their Practice Teaching Phase.
2. The Researcher observed all the lessonsdesigned and implemented by the Student Teachers through Wholistic approach to Science Teaching during their Practice Teaching Phase.
3. Efficacy of the lesson plans implemented by Student Teachers was tested by the researcher through observation schedule.

Phase IV: Post Intervention Programme after Practice Teaching Phase

1. Focused Group Discussion was conducted on teaching Science through Wholistic Approach with Student Teachers of Experiment Group.
2. Interview Schedule was administered on the Student Teachers of Experiment Group.
3. Knowledge and Skill Check up (**KSC3**) was administered on Student Teachers of Experiment Group as Post-test.
4. Story and Crossword Puzzle (**SC3**) were administered on the Student Teachers of Experiment Group as Post-test.
5. Knowledge and Skill Check up (**KSC4**) was administered on the Student Teachers of Experiment Group after 10 days of KSC3 as Post-test.

6. Story and Crossword Puzzle (**SC4**) were administered on the Student Teachers of Experiment Group after 10 days of SC3 as Post-test.
7. Reactions of student teachers of Experimental Group were collected and efficacy of the Educational programme was tested.

3.5. Phases of the Study

Phase I: Preparation of Pre-test, Orientation Programme and Intervention Programme

3.5.1. Preparation of Knowledge and Skill Checkup

For the purpose of developing intervention programme to measure the entry behaviour of student teachers it is essential to find gap between actual understanding of education and wholistic understanding of education. The researcher constructed a knowledge and skill check up. The Knowledge and skill check up was constructed considering various aspects of Wholistic Education, Wholistic Development and Wholistic Approach. The Knowledge and skill check up contains items from the Cognitive, Affective, Psychomotor, Spiritual, Health and Environment domains. The data gathered through the knowledge and skill check up helped in preparation of the orientation programme.

3.5.2. Selection of Story

Purpose for the selection of story was to assess the student teachers on their understanding of affective domain and identification of the spiritual component.

For the purpose of identifying level of the student teachers on understanding of affective domain and identifying the spiritual component from the situation one story was selected. For selection of the story the researcher analysed inspirational stories and selected one story. Situation based story was given to student teachers to identify moral of the story and spiritual attributes.

3.5.3. Preparation of Crossword Puzzle

First of all elements of the Wholistic Approach were identified. After that all the elements were arranged in downs and across to fit in crossword puzzle. Purpose of preparing the crossword was to evaluate student teachers in an interesting way.

3.5.4. Development of Orientation Programme

After implementation of series of pre-testsGroup Discussion was conducted. Group Discussion was conducted on present reforms in curriculum, its transaction, evaluation and impact on Science Teaching. For group discussion the researcher had divided class in three groups. They were given topics and time of 30 minutes for discussion and 10 minutes for presentation. Representative of all the groups'were asked to present their group views on the basis of their discussion. Their presentation was further discussed in class and it was concluded.

The researcher had prepared orientation programme with the help of data collected through Knowledge and Skill Check up, Story and Crossword. Data analysis of the knowledge and Skill Check up, story and crossword the researcher was done to find the awareness of student teachers about Wholistic Approach. In the orientation programme the researcher had raise some question for brain storming of student teachers, such as, explain the terms "whole", "Wholistic" and "Wholistic Education", how to develop child as a Whole Person, need of Wholistic Approach, it's definition, components and assessment.The conclusion arrived at was that there is difference between traditional approach of teaching learning and Wholistic Approach of teaching learning. Concept map of orientation programme is as below:

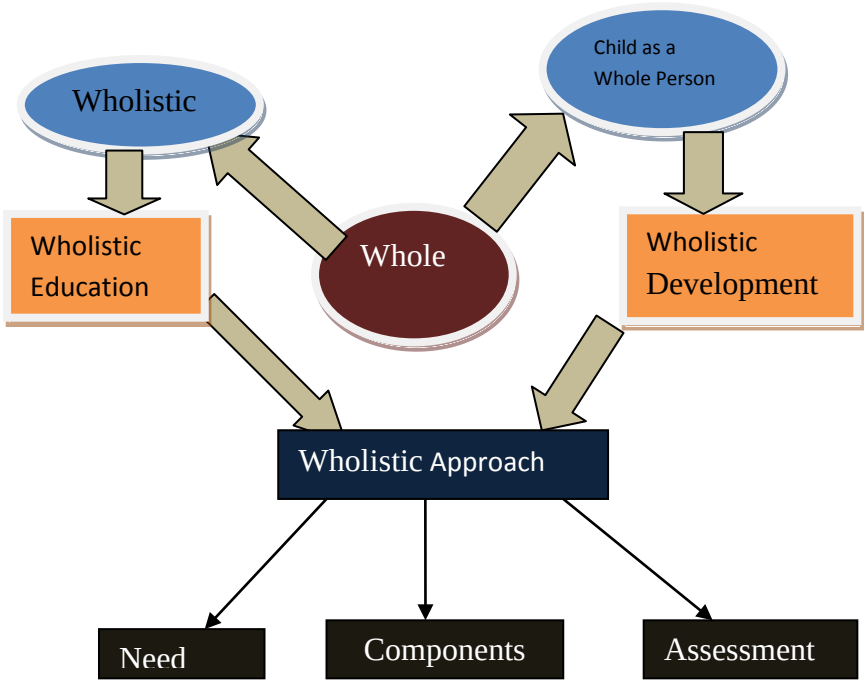

Fig. 3.1.:Concept map for Orientation of Wholistic Approach

3.5.5. Development of Intervention Programme

The researcher had selected ten areas of science which are directly related to real life for the development of intervention programme. The intervention programme was developed for the conceptual development of wholistic approach. The developed programme was based on the student centred activity based approaches. It encompassed group and individual activity, power point presentations, videos, games, experiments and demonstrations. For developing intervention programme guidance was taken from reference books and internet sources. The developed programme was further modified as per the requirement of the field during the implementation phase.

Phase II: Implementation of the Intervention Programme

3.5.6. Implementation of the Intervention Programme

The researcher had administered series of Pre-tests before intervention Programme. The Pre-test consist of Knowledge and Skill Check up, Story and Crossword. The developed intervention programme was implemented on student teachers of Navrachana School of Science & Education, Vadodara in academic year 2013 – 2014.Replication of the study was done in academic year 2014 – 2015 on student teachers of Waymade College of Education, Vallabh Vidhyanagar. The brief implementation plan of the programme is given below:

Day	Topic	Duration	Learning Experience
1	Orientationto Wholistic Approach	90 min	Researcher had introduced Wholistic Approach to the student teachers
2	Tea Preparation	15 min	Pre concept map
		60 min	Wholistic Explanation of the content with the help of PowerPoint Presentation
		15 min	Post Concept map
3	Weight of an object in different media	15 min	Activity
		60 min	Wholistic Explanation of the content with
		15 min	Discussion and Conclusion

4	Fountain	15 min	Observation and Discussion
		60 min	Wholistic Explanation of the content
		15 min	Discussion and conclusion
5	Water purification	15 min	Power Point Presentation
		60 min	Wholistic Explanation of the content with Images, questions, Discussion and Conclusion
		15 min	Discussion and conclusion
6	Candle	15 min	Observation and Listing
		60 min	Wholistic Explanation of the content
		15 min	Discussion and conclusion
7	Crackers	15 min	Short film
		60 min	Wholistic Explanation of the content
		15 min	Discussion and Conclusion
8	States of Matter	15 min	Activity
		60 min	Wholistic Explanation of the content with, images, questions, Discussion and Conclusion
		15 min	Discussion and conclusion
9	Ignition and combustion	15 min	Demonstration and Questions
		60 min	Wholistic Explanation of the content
		15 min	Discussion and Conclusion
10	Friction	15 min	Activities and discussion
		60 min	Wholistic Explanation of the content
		15 min	Discussion and conclusion

11	Soil Pollution	15 min	Short film
		60 min	Wholistic Explanation of the content
		15 min	Discussion and Conclusion
12	Orientation for preparation of lesson plan for practice teaching	90 min	Guidance for preparation of lesson plan
13	Preparation of Lesson Plans by student teachers	90 min	Student teachers made lesson plans for practice teaching

Table 3.1.: Plan of orientation programme and implementation programme

Phase III: Observation of Student Teachers during Practice Teaching Phase in Schools

The practice teaching Phase of Navrachana School of Science & Technology was from 16th January 2014 to 31st January 2014. The practice teaching phase of Waymade college of Education was from 1st September 2014 to 6th September 2014. Experiment Group Student Teachers had implemented lesson plans designed through Wholistic approach to Science Teaching in school during their Practice Teaching Phases. The Researcher had observed all the lessonsdesigned and implemented by the Student Teachers through Wholistic approach to Science Teaching during their Practice Teaching Phase. At the end of the day reflections of the student teachers were collected on the implemented lessons through Wholistic Approach to Science teaching. Efficacy of the lesson plans implemented by Student Teachers was tested by the researcher through observation schedule.

Phase IV: Post Intervention Programme after Practice Teaching Phase

After completion of the Practice Teaching Phase in the school the researcher had conducted Focused Group Discussion on science teaching through Wholistic Approach with Student Teachers of Experiment Group. Further it was followed by

Interview Schedule of Student Teachers. After that series of Post-tests were administered on the Student Teachers of experiment group. Finally, Reactions of student teachers of Experimental Group were collected and efficacy of the Educational programme was tested.

3.6. Tools and Techniques for Data Collection

3.6.1. Knowledge and Skill Check up (KSC):

Knowledge and Skill Check up wasconstructed to evaluate knowledge and skill of the student teachers on wholistic approach to science teaching. It was constructed on the basis of various principles of wholistic approach in terms of understanding of the whole, i.e., understanding of interrelation, interdependence and coherence and its relation with self, health, community and environment; ability to impart the whole i.e. teaching skills to impart interrelated, interdependent and coherent contents and its relation with self, health, community and environment for developing values, attitude, spiritual qualities, morality, ethics, reflective thinking, and ability to solve a problem as a whole. There are total 25 items in the Knowledge and Skill Check up.

3.6.2. Story

A situationbased story was provided to the experimental group Student Teachers to identify Spiritual Qualities contained therein. Further they were asked to draw moral out of the story.

3.6.3. Crossword Puzzle

Student Teachers were given a crossword Puzzle to solve, the puzzle of Wholistic Approach with the clues down and across. There were 10 across and 17 down in the crossword puzzle.

3.6.4. Group Discussion

The researcher had conducted group discussion with the Experimental Group about present Education system for science teaching.Group discussion was conducted with Student Teacher of the Experimental group on prevailing science education i.e. present reforms in curriculum & its transaction, evaluation and their impact on Science Teaching, need and scope of improvements in science education. For group discussion the researcher had divided class in three groups. They were given topics

and time of 30 minutes for discussion and 10 minutes for presentation. All the groups' representative presented their group views on the basis of their discussion. Their presentation was further discussed in class and it was concluded.

3.6.5. Observation Schedule

An Observation Schedule was constructed by the researcher to observe the implementation of lessons designed by Student Teachers through Wholistic Approach to teaching science during practice teaching. Student teachers were observed when they implemented the lesson plans through wholistic approach.The observation schedule contains the elements to be observed, namely,cognitive component, affective component, psychomotor domain, spiritual domain, health and environment, and wholistic flow of teaching of the student teacher.

3.6.6. Focused Group Discussion

The researcher had conducted Focused Group Discussion on teaching Science through Wholistic Approach with Experimental Group Student Teachers. Focused of the Discussion was as follows:

(1) Why there is a need of Wholistic Approach of teaching Science?

(2) What should be the efforts for preparing lesson plans for Wholistic Approach to teaching science?

(3) What ought to be the age of students for implementing Wholistic Approach of teaching science? Why?

3.6.7. Interview Schedule

A structured interview schedule was prepared for interviewing student teachers for gathering data. Student teachers of the Experimental Group were interviewed for gathering feedback on their experience of implementing lessons designed through wholistic approach.

3.6.8. Reaction Scale

To study the reactions of the student teachers towards the implemented intervention programme and Wholistic Approach of Teaching Science, a reaction scale was developed. Five point Reaction Scale was employed for gathering the reactions of the student teachers on the wholistic approach of teaching science. Five Points of the

reaction scale are Strongly Agree, Agree, Neutral, Disagree and Strongly Disagree. The reaction scale consistedof a total of 26 statements.

3.6.9. Tools and Techniques Objective-wise

No.	Objectives	Tools / Techniques
1.	Objective 2	Group Discussion
2.	Objective 2	Knowledge and Skill Check up
3.	Objective 2	Story
4.	Objective 2	Cross Word
5.	Objective 2	Focused Group Discussion
6.	Objective 2	Observation Schedule
7.	Objective 2	Interview Schedule
8.	Objective 3	Reaction Scales for student teachers

Table 3.2.: Objective – wise Tools and Techniques

3.7. Data Collection

The researcher took permission from the Collegesof Education to conduct the study. The researcher had also taken permission from the schools for observation of student teachers' lessons during their practice teaching phase. The Colleges of Educationand schools were assured that the data collected would be kept confidential and will be used only for research purpose. Data collection of the study was done as follows:

1. Data were collected by administering Knowledge and Skill Check up, Story and Crossword Puzzle on student teachers of the Experimental group as Pre-test. The Experimental Group was repeatedly pretested for second time after 10 days of the first pre-test.
2. Data were collected through Group Discussion in the Present Education System for science teaching.
3. Data were collected by observation of the implementation process by the student teachers on Experimental Group school students through Observation Schedule.

4. Data were collected through Focused Group Discussion and by implementing Interview Schedule on the Experimental Group Student Teachers.
5. Data were collected by administering Knowledge and Skill Check up, Story and Crossword on student teachers of the Experimental group as Post-test. Experimental Group was repeatedly post-tested for second time after 10 days of first post-test.
6. Reactions of the student teachers were gathered with the help of reaction scale on the wholistic approach.

The data collection was done personally by the researcher in Navrachana School of Science and Education, Vadodara during academic year 2013 – 2014 and the Waymade College of Education, Vallabh Vidhyanagar during academic year 2014 – 2015.

3.8. Data Analysis

Data collected through Knowledge and Skill Check Up was analyzed through content analysis and t-test. Data collected through story were analyzed by content analysis. Data collected through crossword Puzzle were analyzed by mean, median, mode and O-give curve. Data collected through pre-tests and post-tests were analyzed by employing thet-test to find out significance of difference between the pre-tests and post-tests mean scores. Data of the reaction scales and observation schedule were analyzed by computing frequency, percentage and chi-square. Data collected through Group Discussion, Focused Group Discussion and Interview schedule were analyzed through content analysis.

3.8.1. Data Analysis Techniques Employed Objective-wise

No.	Objectives	Tools / Techniques	Analysis Technique
1.	Objective 2	Group Discussion	Content Analysis
2.	Objective 2	Knowledge and Skill Check up	Content Analysis and t (Test of Difference Means for Correlated Groups Difference Method)
3.	Objective 2	Story	Content Analysis

4.	Objective 2	Crossword Puzzle	Mean, Median, Mode, Q_1, Q_2, Q_3, Q_4 and O-give curve
5.	Objective 2	Focused Group Discussion	Content Analysis
6.	Objective 2	Observation Schedule	Frequency, Percentage and Graphs
7.	Objective 2	Interview Schedule	Content Analysis
8.	Objective 3	Reaction Scale for student teachers	Frequency, Percentage and Chi-square

Table 3.3.: Data Analysis Techniques Employed Objective-wise