CHAPTER- III

Research Methodology

In the first chapter, researcher presented with an introduction to the problem, stated the problem and brought out the rationale of the problem. Further researcher formulated objectives of the study and also framed research question that guided the research work. At the end researcher has mentioned limitations of the study. In the second chapter, brief review of researches conducted by various researchers has been mentioned.

In the present chapter, the methodology of the present study is elaborated. This chapter is an important and central to the present study. This is the portion that deals with all the strategies implemented to gather data and methodological procedures this research work has been conducted by the researcher.

Research methodology involves the systematic procedure by which the researcher starts from initial identification of the problem to its final conclusion. The role of methodology is to carry on the research work in a specific and valid manner. A good deal of objectivity and reliability of a research report depends upon the method used for investigation. They indicate the various steps of the plan, which are to be adopted in solving a research problem. It is, therefore very important that a researcher must have a thorough understanding of all research methods- their strengths, limitations, applications and appropriateness.

The present chapter concerned with the details of the techniques adopted in the study. It describes the methodological aspects of the study. It elaborates

1) Research Design

2) Population and Sample

3) Data Collection

4) Analysis and presentation of data

5) Statistical Techniques

3.1 Research Design

A descriptive survey design was adopted to investigate pupil-teachers' awareness and perceptions of ATLs. This non-experimental approach enabled systematic collection and analysis of participants' self-reported data at a single point in time.

3.2 Population and Sampling

Population: All pre-service pupil-teachers enrolled in B.Ed.–M.Ed. Integrated and related teacher-education programs at RIE Bhopal during the 2024–2025 academic session.

Sampling Method: Convenience sampling was used due to time constraints and accessibility.

Sample Size: 100 pupil-teachers across five programs.

3.3 Data-Collection Instrument

A structured questionnaire was developed by the researcher, comprising two sections: *Awareness Items:* Fifteen dichotomous ("Yes/No") statements probing familiarity with ATL's existence, eligibility criteria, funding, curricular integration, technology tools (coding, 3D printing), design thinking, and desire for formal training. *Perception Items:* Fifteen three-point Likert-type statements ("Agree," "Disagree," "Can't say") assessing views on ATL's role in developing 21st-century skills, fostering innovation, enhancing STEM education, promoting inclusion, influencing employability, and the necessity of teacher training and infrastructure.

The questionnaire was validated by supervisor (faculty at RIE Bhopal) to check clarity and reliability.

3.4 Data-Collection Procedure

The study employed a structured questionnaire to examine pupil-teachers' awareness and perceptions of Atal Tinkering Labs (ATLs). Data were gathered through direct, in-person administration of the survey instrument in the classrooms of the relevant teacher-education programs.

Based on enrolment records from the Regional Institute of Education, Bhopal, five cohorts were targeted: B.A. B.Ed., B.Sc. B.Ed., B.Ed., Integrated B.Ed.–M.Ed., and ITEP. Prior to fieldwork, the researcher obtained official permission from institute authorities and course

coordinators. On visit, the researcher entered the classroom at the beginning of the scheduled period, introduced themselves and the purpose of the study, and distributed printed consent forms. Pupil-teachers were informed that participation was voluntary, responses would remain confidential, and aggregated results would be used solely for academic reporting. The researcher handed out the survey instrument (bilingual English–Hindi version) and Participants completed Sections 1–3 in roughly 15–20 minutes under the researcher's supervision, allowing immediate clarification of any item if needed. Data collection took place over a four-week period (March–April 2025).

3.5 Data Analysis and Presentation

Descriptive Statistics: Frequencies and percentages summarized responses to awareness and perception items.

Course-Wise Descriptive Statistics: Means (M) and standard deviations (SD) were computed for overall awareness and perception scores within each of the five teacher-education programs.

Inferential Statistics: A one-way Analysis of Variance (ANOVA) tested for statistically significant differences in mean awareness and perception scores across the five programs and when result is significant difference then Pairwise t-test is used.

Software Used: Data were entered and analyzed using Microsoft Excel.

3.6 Limitations of the Methodology

Sampling Bias: Convenience sampling may limit the generalizability of findings.

Self-Report Measures: Responses may be affected by social-desirability bias or limited self-awareness.

Cross-Sectional Design: The study captures a snapshot in time, precluding longitudinal analysis of how awareness and perceptions evolve.

By rigorously following this methodological framework, the study generated empirical insights into how prepared and inclined future teachers are to support and implement Atal Tinkering Labs in Indian schools. The result analysis of study is presented in chapter 4.