3 CHAPTER 3: RESEARCH METHODOLOGY

3.1 Introduction

Methodology serves as the backbone of any rigorous academic inquiry. In the context of this dissertation, which investigates the role of Artificial Intelligence (AI) tools in English language teaching at secondary level: Possibilities and challenges among Class 9 students in a government school in India. It provides a detailed framework to measure effectiveness, analyse user experience and derive meaningful conclusions from both quantitative and qualitative data.

In this research design, sampling procedures, tools, intervention process, ethical considerations and analytical strategies employed in the study. It also reflects on the validity and reliability of the methodology to ensure the research findings are credible and applicable to similar educational contexts.

3.2 Research Design

The present study employs a quantitative, quasi-experimental, pretest-post-test single group design aimed at assessing the impact of selected AI tools—ChatGPT, Grammarly and Microsoft Copilot—on the story writing abilities of Class 9 students at Kendriya Vidyalaya, Pusa, Bihar. This design is particularly suitable for intervention-based educational studies, where ethical or logistical constraints prevent the use of randomized control trials (RCTs).

Nature of the Quasi-Experimental Design

Quasi-experimental designs are widely used in educational research due to their practical utility in real-world classroom settings. Unlike true experiments, these designs do not randomly assign participants to control and experimental groups, but still retain elements of controlled intervention and systematic observation.

In this case, the absence of a control group was necessitated by ethical considerations—denying students access to potentially beneficial learning tools was deemed inappropriate. However, the study maintains internal consistency by using pre-test and post-test data to measure change within the same group of learners.

Visual Model of the Design

Stage	Group	Intervention	Assessment
Week 1	Class 9 (n=32)	Orientation, AI tool training	Pre-test: Story writing
Week 2	Same group	AI-assisted writing sessions	Post-test: Story writing

Table 3.1: Weekly Plan of intervention

Rationale for Choosing the Design

The rationale for choosing a single-group pretest-post-test quasi-experimental design is grounded in three core considerations: ethical access, contextual feasibility and pedagogical relevance.

3.3 Ethical Considerations

In educational settings—especially in government schools—providing unequal access to digital resources could exacerbate already existing inequalities. As such, assigning some students to a control group with no access to AI tools would have been both ethically problematic and demotivating.

Practical Feasibility

The study was conducted in a school with limited digital infrastructure: a single computer lab with constrained access, variable internet connectivity, and no regular tech-support staff. Creating and managing multiple treatment conditions under such constraints would have been logistically unmanageable.

Pedagogical Alignment

The chosen design supports formative, process-based assessment, a key feature of writing pedagogy. By allowing students to experience the writing cycle with AI assistance and then re-assess their performance, the design mirrors best practices in iterative learning models. It also aligns with the principles of constructivist pedagogy, which values student engagement, feedback, and reflection.

Support from Literature

This design is widely validated in educational research. For instance, topping et al. (2017) used a similar design to evaluate peer tutoring, while Chou & Feng (2019) used it to assess mobile learning apps in Chinese ELT contexts. The internal consistency of using the same rubric, task type, and time duration for both pretest and posttest ensures that observed gains can be reasonably attributed to the intervention.

3.4 Population and Sampling

Target Population

The population for this study comprises Class 9 students at Kendriya Vidyalaya, Pusa, Bihar—a centrally run government school catering to a semi-urban population. Kendriya Vidyalayas serve a wide range of learners, including children of government employees, residents and transfer-prone professionals. The socio-economic composition is mixed, with students from lower-middle-class and working-class families forming the majority.

Sample Description

A total of 32 students participated in the study. All were from Class 9 and had prior exposure to English instruction as per the Central Board of Secondary Education (CBSE) curriculum.

Demographic Snapshot:

Variable	Category	Count
Gender	Boys	15
	Girls	17
Age Range	13–15 years	100%
Home Language /First language	Hindi	90%
Prior AI Exposure	None to minimal	100%
English Proficiency	Intermediate (self/teacher rated)	~85%

Table 3.2: Demographic details

Sampling Technique

The sample was selected using a convenience sampling method, based on availability, consent, and teacher recommendation. While not statistically random, this method was appropriate given the constraints of school access, scheduling and ethical approval.

Justification for Sample Size

Though small, the sample size of 32 is sufficient for pre-test & post-test statistical analysis using paired sample t-tests. This sample size aligns with similar pilot studies in ELT and EdTech research (e.g., Nguyen et al., 2021; Patel & Rao, 2022), which use class-sized groups to evaluate instructional innovations.

1. Limitations of Sampling.

2. Limited generalizability to other school types (private, urban, rural).
3. Potential bias due to non-random selection.
4. Over-reliance on voluntary participation, possibly skewing motivation levels

Despite these limitations, the sample provides a rich, contextually grounded dataset from a population often underrepresented in educational technology research.

3.5 Research Tools and Instruments

This study utilized a range of tools and instruments, both digital and instructional, to facilitate the intervention and evaluate its impact. The tools were selected to align with the goals of promoting story writing skills through AI integration in a government school context. They fall into three main categories: assessment instruments, instructional modules and AI-based writing tools.

Evaluation Rubric

Both pre-test and post-test responses were assessed using a **standardized 50-point rubric** developed by the researcher in consultation with English language experts. The rubric evaluates five key writing dimensions:

Section	Maximum Marks
Section A: Understanding the Basics of a Story	10
Section B: Elements of Story Writing	15
Section C: Story Analysis	10
Section D: Creative Writing	15

Table 3.3: Evaluation Rubrics

Each section was well developed by researcher in accordance with student's level of learning. The rubric was pre-tested with two English teachers to ensure **clarity, relevance and usability**.

3.6 Intervention Procedure

The study unfolded over a **two-week period**, divided into four structured synchronised stages. Each stage was planned with detailed objectives, activities and assessment checkpoints.

Stage I: Orientation and Baseline Assessment

- Introduction to the study's purpose, tools and expectations.
- Ice-breaker session on "what makes a good story."
- **Pre-test story writing** conducted under exam conditions.

Stage II: AI Tool Training

- **ChatGPT training** Scenario prompts, brainstorming exercises. Ethical use discussions (e.g., avoiding full copy-paste, cultural and gender sensitivity)
- **Grammarly training** Correcting sample stories using Grammarly .Understanding grammar explanations
- **Microsoft Copilot training** Using rewrite and summarize features. Practice on example texts. Training was supported by:

Stage III: Writing Sessions with AI

Some structured sessions which include

- Prompt-based story drafting
- Use of AI tools in drafting/editing
- Teacher-facilitated review and reflection

Stage IV: Post-test Assessment

- Conducted under the same conditions as the pretest.
- Students also shared **feedback** and a **verbal testimony** on their AI learning experience.

3.7 Ethical Considerations

Given that the study involved minors, it was aligned with national and institutional research ethics guidelines.

1. **Informed Consent**

- Permission was obtained from the **school principal** and **teachers.**
- Students were told they could withdraw at any time.
- No grades or incentives were tied to participation.
- Students were encouraged but not pressured to use all tools.

2. **Responsible AI Use**

Students were taught not to plagiarize AI-generated content. use suggestions as guidance, not replacement. And to reflect on feedback critically.

This aligns with emerging guidelines for **AI ethics in education**, including UNESCO's "Ethics of Artificial Intelligence" (2021), which emphasizes human oversight and accountability.

3.8 Data Analysis Techniques

It deals with the statistical procedures applied to analyse quantitative data collected from the pre-test and post-test story writing assessments of Class 9 students. The

analysis aimed to evaluate whether the use of AI tools—ChatGPT, Grammarly and Microsoft Copilot—led to statistically significant improvement in writing performance.

Overview of Quantitative Data Collected

The primary dataset comprised scores from: Pre-test story writing assessment & Post-test story writing assessment

Each student's performance was scored using a 50-point rubric covering five categories: Plot Development, Characterization, Grammar and Language Use, Vocabulary and Organization. The same rubric and evaluators were used for both pretest and post-test assessments to ensure consistency.

3.9 Limitations of the Methodology

Despite its careful design and execution, the study has certain limitations that must be acknowledged. These limitations do not invalidate the findings but rather contextualize them within a set of practical constraints and methodological decisions.

1. **Non-Random Sample**

The sample size (n=32) limits **statistical generalizability**. Participants were selected via **convenience sampling**, introducing potential selection bias.

2. **Single School and Class**

Results are specific to **Class 9 students** at one **Kendriya Vidyalaya**. The unique demographic, infrastructure and teacher support may not be replicable across all government schools in India.

3. **Short Duration of Intervention**

The two-week time-frame is insufficient to assess **long-term retention** or **sustained skill improvement**. Longer interventions might yield different results, especially in complex areas like writing.

4. **One single Group**

Due to ethical concerns, single group was used so no one should be deprived of accessibility of modern AI technologies used in language teaching

5. **Tool-Specific Constraints**

ChatGPT requires a stable internet connection, which was inconsistent and, it has paid features were inaccessible. **Grammarly's premium features** were not accessible; only the free version was used. **Microsoft Copilot** is still evolving; some functions were not optimized for Indian English classrooms.