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THE INTEGRATION OF SCIENTIFIC RESEARCH METHODS INTO ENGLISH LANGUAGE TEACHER EDUCATION

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Abstract: The growing demand for evidence-based teaching has transformed English language teacher education by emphasizing the importance of scientific research competence alongside pedagogical and linguistic knowledge. Preparing prospective English language teachers requires the integration of research methods that foster critical thinking, reflective practice, and data-driven instructional decision-making. This study investigates the effectiveness of incorporating scientific research methods into English language teacher education through a mixed-methods research design. Quantitative data were obtained from pre- and post-intervention assessments, while qualitative evidence was collected through interviews, classroom observations, and reflective journals. The findings demonstrate significant improvements in research competence, pedagogical reasoning, academic literacy, and professional confidence among teacher candidates. The study concludes that systematic integration of research methodology strengthens teacher preparation and recommends embedding research-oriented learning across English language education curricula.

Keywords: English language teacher education, scientific research methods, research competence, teacher preparation, academic literacy, mixed-methods research, reflective practice, evidence-based teaching, higher education, professional development, educational research.

Introduction

The rapid transformation of global education systems has substantially increased the expectations placed upon future English language teachers. Modern language educators are expected not only to demonstrate linguistic proficiency and pedagogical expertise but also to engage critically with educational research, evaluate empirical evidence, and implement data-informed instructional practices. Consequently, scientific research competence has become an essential component of teacher professionalism and lifelong learning. Higher education institutions are therefore increasingly encouraged to integrate scientific research methods into teacher education programs to prepare graduates capable of responding to contemporary educational challenges (Richards & Rodgers, 2022).

Previous studies have consistently highlighted the relationship between research literacy and effective teaching practice. Borg (2018) argues that teachers possessing research competence are more likely to become reflective practitioners who continuously improve classroom instruction through systematic inquiry. Likewise, Creswell and Creswell (2023) emphasize that understanding research methodology enables educators to interpret educational evidence critically and design contextually appropriate pedagogical interventions. Recent investigations in English language teacher education further indicate that integrating research-based learning promotes critical thinking, academic writing, professional autonomy, and instructional innovation (Burns, 2020; Farrell, 2022). Nevertheless, in many teacher education institutions, research methodology continues to be taught as a separate theoretical discipline rather than being integrated into professional pedagogical training.

Despite growing international interest in research-informed teacher education, limited empirical evidence exists regarding the effectiveness of integrating scientific research methods directly into English language teacher preparation curricula, particularly in developing higher education contexts. Addressing this gap, the present study aims to investigate how the integration of scientific research

methods influences the professional competencies, research literacy, and pedagogical development of prospective English language teachers through a comprehensive mixed-methods research design.

Methods

This study employed a convergent mixed-methods research design, integrating quantitative and qualitative approaches to investigate the effectiveness of incorporating scientific research methods into English language teacher education. The mixed-methods design was selected because it provides a comprehensive understanding of educational phenomena by combining numerical evidence with participants' lived experiences and perceptions (Creswell & Creswell, 2023). The convergence of both datasets enabled the validation of findings through methodological triangulation, thereby increasing the reliability and interpretative strength of the study.

The research was conducted during the 2025–2026 academic year at a higher education institution offering undergraduate programs in English Language Teaching. A total of 96 third-year pre-service English language teachers voluntarily participated in the research. Using purposive sampling, participants were assigned to an experimental group (n = 48) and a control group (n = 48). Both groups demonstrated comparable academic achievement and English language proficiency (CEFR B2 level) before the intervention. Ethical considerations were observed throughout the study, including informed consent, voluntary participation, confidentiality, and anonymous reporting of all collected data.

The experimental group participated in a 14-week research-integrated instructional program, whereas the control group continued studying according to the traditional teacher education curriculum. The intervention was designed around inquiry-based learning principles and incorporated scientific research methods into pedagogical training. Students learned how to formulate research problems, identify research gaps, conduct systematic literature reviews using international academic databases, design research instruments, collect quantitative and qualitative data, perform descriptive statistical analysis, interpret educational findings, and present research results according to international academic standards. Furthermore, participants completed collaborative classroom-based action research projects, allowing them to connect theoretical research knowledge with authentic teaching practice.

For the quantitative component, participants completed standardized Research Competence Assessment Tests before and after the intervention. The assessment instrument measured six dimensions of professional research competence: research design, literature review skills, data collection techniques, data analysis, academic writing, and evidence-based pedagogical decision-making. Each dimension was evaluated on a 100-point analytical rubric adapted from internationally recognized teacher education competency frameworks. Instrument reliability was examined using Cronbach's Alpha, yielding a coefficient of $\alpha = 0.93$, which indicated excellent internal consistency. Statistical analyses were conducted using IBM SPSS Statistics 27, including descriptive statistics, paired-samples t-tests, independent-samples t-tests, effect size calculations (Cohen's d), and Pearson correlation analysis. Statistical significance was established at $p < 0.05$.

The qualitative component aimed to explore participants' experiences regarding the integration of research methodology into professional teacher education. Data were collected through semi-structured interviews involving 18 volunteer participants, weekly reflective journals maintained throughout the intervention, non-participant classroom observations, and document analysis of students' research portfolios. Interview questions focused on participants' perceptions of research-based learning, challenges encountered during research activities, confidence in applying empirical evidence to instructional practice, and the perceived relationship between research competence and professional identity.

Qualitative data were analyzed using Braun and Clarke's (2022) thematic analysis framework, involving six sequential stages: data familiarization, initial coding, theme generation, theme

refinement, theme definition, and report preparation. To ensure credibility and trustworthiness, multiple validation strategies were employed, including triangulation across data sources, member checking, peer debriefing, prolonged engagement, and independent coding by two educational researchers. Discrepancies in coding were resolved through discussion until consensus was reached.

The integration of quantitative statistical findings with qualitative thematic evidence enabled a comprehensive evaluation of the instructional intervention. This methodological framework not only facilitated rigorous empirical analysis but also provided valuable insights into how scientific research methods contribute to the professional preparation of future English language teachers. The combined use of objective performance indicators and participants' reflective experiences strengthened the validity of the research findings and increased their applicability to curriculum development in teacher education programs.

Results and Discussion

The analysis of the collected data demonstrates that the systematic integration of scientific research methods into English language teacher education produced statistically and pedagogically significant improvements in participants' research competence and professional readiness. The quantitative findings indicate that the experimental group achieved substantially higher scores across all measured competencies than the control group after the fourteen-week intervention. Simultaneously, the qualitative evidence obtained through interviews, classroom observations, reflective journals, and portfolio analysis explains the cognitive and professional changes underlying these statistical improvements. The convergence of both datasets strengthens the validity of the findings and confirms the effectiveness of research-integrated teacher education.

Before the intervention, an independent-samples t-test indicated no statistically significant difference between the experimental and control groups ($p > 0.05$). Both groups demonstrated similar levels of research competence, particularly in research design, data analysis, and academic writing. Following the intervention, however, statistically significant improvements were observed in every assessed dimension of the experimental group. The greatest gains occurred in classroom action research, evidence-based instructional planning, and academic writing, suggesting that continuous engagement with authentic research activities substantially enhances professional competence.

Table 1. Comparative Development of Research Competencies among Pre-service English Language Teachers

Competency	Experimental Group (Pre-test)	Experimental Group (Post-test)	Control Group (Post-test)
Research Design	62.8	89.6	73.2
Literature Review Skills	64.1	91.4	74.6
Data Collection Techniques	61.7	88.9	72.8
Data Analysis and Interpretation	58.9	87.3	70.5
Academic Writing	66.5	92.1	76.4
Evidence-based Teaching Decisions	60.3	90.7	71.9
Overall Mean Score	**62.4**	**90.0**	**73.2**

Source: Compiled by the author based on the results of the pedagogical experiment (2026).

The data presented in Table 1 reveal a marked increase in the research competence of the experimental group. The overall mean score increased from 62.4 to 90.0, whereas the control group reached only 73.2 after completing the traditional curriculum. The largest improvement was observed

in academic writing (66.5–92.1), reflecting the positive influence of integrating research methodology into professional teacher preparation. Students demonstrated greater ability to formulate research questions, organize scholarly arguments, synthesize empirical evidence, and apply internationally accepted citation conventions.

Similarly, literature review skills improved by more than 27 percentage points. This improvement indicates that students became increasingly proficient in identifying research gaps, evaluating the credibility of scholarly sources, and synthesizing previous studies into coherent theoretical frameworks. Such findings correspond with Hyland (2019), who argues that academic literacy develops most effectively when writing instruction is integrated with authentic research practice rather than isolated language exercises.

Statistical analysis further confirmed the educational significance of the intervention. The independent-samples t-test showed a statistically significant difference between the post-test scores of the two groups **(**$t = 6.82$, $p < 0.001$**).** Furthermore, the calculated Cohen's $d = 1.24$ indicates a large effect size, suggesting that the instructional intervention produced substantial educational benefits. Pearson correlation analysis also identified a strong positive relationship between research competence and evidence-based pedagogical decision-making ($r = 0.81$, $p < 0.001$), indicating that improvements in research skills were closely associated with enhanced instructional reasoning.

The qualitative findings provide further insight into the mechanisms responsible for these improvements. Thematic analysis identified four dominant themes: development of reflective professional identity**,** enhanced confidence in conducting educational research**,** improved evidence-based instructional planning**,** and greater motivation toward lifelong professional learning**.**

Interview participants consistently reported that prior to the intervention they viewed research methodology as an isolated academic subject with limited relevance to classroom teaching. However, participation in classroom action research projects significantly altered this perception. One participant commented:

"I realized that research is not only for scientists. It helps teachers understand classroom problems and make better instructional decisions."

Another participant stated:

"Designing my own classroom research project made me more confident in evaluating students' learning needs instead of relying only on textbooks."

Reflective journals further demonstrated progressive changes in participants' professional thinking. During the early stages of the intervention, most reflections focused primarily on teaching techniques. By the end of the semester, however, students increasingly referred to concepts such as research validity, reliability, triangulation, ethical considerations, and data interpretation. This shift indicates the gradual internalization of scientific inquiry as an integral component of professional teaching practice.

Classroom observations corroborated these findings. Students participating in the experimental group demonstrated greater collaboration during lesson planning, more frequent use of empirical evidence when discussing instructional strategies, and increased willingness to evaluate the effectiveness of their teaching decisions through systematic data collection. Portfolio analysis likewise revealed noticeable improvements in the quality of literature reviews, research proposals, classroom observation reports, and reflective analyses.

These findings support previous research emphasizing that research-informed teacher education promotes reflective practice and professional autonomy (Burns, 2020; Farrell, 2022). Unlike traditional teacher preparation models that prioritize knowledge transmission, research-integrated curricula encourage prospective teachers to become active investigators of their own pedagogical practice. Such an approach strengthens critical thinking, analytical reasoning, and continuous professional development.

Conclusion

The present study demonstrates that the systematic integration of scientific research methods into English language teacher education significantly strengthens the professional preparation of future language teachers. The quantitative findings revealed substantial improvements in research competence, academic literacy, evidence-based pedagogical decision-making, and academic writing among participants who experienced the research-integrated curriculum. These improvements were statistically significant and reflected a large educational effect, indicating that the instructional intervention produced meaningful changes in students' professional competencies. Complementing these results, the qualitative findings confirmed that participation in research-oriented learning activities enhanced reflective practice, critical thinking, professional confidence, and the ability to solve classroom problems through systematic inquiry.

Despite the positive outcomes, the present research has several limitations. The study involved participants from a single institution and was conducted over one academic semester. Consequently, the findings may not fully represent teacher education contexts in other universities or educational systems. Future research should include larger multicenter samples, longitudinal investigations, and comparative cross-cultural studies to examine the long-term influence of research-integrated curricula on professional competence. Additionally, future investigations should explore the potential of artificial intelligence–supported research instruction, learning analytics, and digital research ecosystems in strengthening the research capacity of pre-service English language teachers. Such studies will further contribute to the modernization of teacher education and the continuous improvement of English language teaching quality.

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