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Enhancing Teachers' Research Competence Through a Structured Seminar–workshop Integrating Responsible Generative AI: An Action Research

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Abstract

Teacher-led action research is widely recognized as a key strategy for improving instructional practice, strengthening reflective teaching, and supporting evidence-based decision-making in schools. However, many teachers experience limitations in research competence, confidence, and readiness, particularly in navigating emerging technologies such as Generative Artificial Intelligence (GenAI). This action research evaluated the effectiveness of a three-day seminar–workshop designed to enhance teachers' action research competence and promote the responsible use of GenAI in academic writing. The study employed an evaluative action research design involving planning, action, observation, and reflection. Participants were teachers from the Mindanao State University – Integrated Laboratory School who voluntarily attended the seminar–workshop. Data were gathered using two researcher-developed instruments: the Teachers' Action Research Competence Questionnaire, which measures knowledge, confidence, and readiness, and the Seminar–Workshop Effectiveness Questionnaire, which assesses program content and structure, impact on action research competence, and responsible use of GenAI. Quantitative data were analyzed using descriptive statistics, while qualitative insights were obtained from participant outputs and observations. Results showed that teachers demonstrated positive levels of action research competence across all domains, reflecting adequate knowledge, improved confidence, and strong readiness to engage in classroom-based research. Participants also rated the seminar–workshop as highly effective, particularly in enhancing research skills and fostering ethical and transparent use of Generative AI. These findings indicate that structured, hands-on professional development integrating research training with responsible technology use can effectively strengthen teacher research capacity. The study underscores the value of action research-based seminar–workshops in cultivating research-engaged, ethically responsible, and technologically informed educators.

Keywords: Action Research, Generative Artificial Intelligence, Seminar–workshop Effectiveness, Teacher Professional Development.

Introduction

The emergence of Generative Artificial Intelligence (GenAI) as a transformative technology that positively improves educational practices requires the promotion of professional development programs to address the evolving educational demands of teachers for strengthening pedagogical competence and research capability (1, 2). As education systems increasingly emphasize data-driven instruction, reflective practice, and continuous improvement, teachers are expected not only to deliver content but also to examine and refine their classroom strategies through systematic action research systematically (3-5). In this context, capacity-building initiatives that integrate foundational research skills with emerging digital tools play a vital role in enhancing instructional quality, promoting innovation, and fostering evidence-based decision-making in schools. Recent advancements in educational technology, particularly Generative AI, have further transformed instructional design and academic writing, prompting educators to seek structured professional development that cultivates both research literacy and responsible AI use (6-8).

Moreover, evidence-based studies show that

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responsible GenAI use improves teachers' educational research and academic writing skills, provided they are adequately trained and have learned the proper and ethical use of GenAI's advanced features, while also addressing the emerging issues and concerns inherent in its use (9, 10). Contemporary studies highlight its potential to support idea generation, language refinement, literature mapping, and drafting assistance, thereby enhancing research productivity when used responsibly (11, 12). At the same time, concerns about fabricated citations, algorithmic bias, overreliance, and the erosion of academic integrity have prompted calls for educators to receive structured AI literacy training (13, 14). Empirical studies indicate that while teachers increasingly experiment with GenAI tools, many lack formal guidance on ethical boundaries, disclosure practices, and validation strategies (15, 16). Consequently, professional development programs integrating research competence with responsible AI use are becoming an urgent priority in teacher education (17).

Despite growing expectations for teacher-led inquiry, many educators continue to encounter challenges in conceptualizing action research topics, synthesizing literature, designing feasible methodologies, and ensuring ethical compliance (18-20). Preliminary feedback from MSU-ILS teachers participating in the Teachers' Action Research: Step-by-Step Design with Responsible Generative AI for Writing & Research program indicated variability in confidence, readiness, and familiarity with research processes (8, 21, 22). These challenges align with prior studies showing that teachers often struggle with research formulation, data collection, and analysis due to limited training and insufficient guided practice (22). Given the increasing role of Generative AI in academic contexts, there is also a rising need to ensure that educators understand both its potential and its risks, particularly in maintaining academic integrity and avoiding misuse, such as fabricated citations or AI-generated data (7, 23, 24).

The three-day seminar–workshop conducted at MSU-ILS was designed to address these gaps by providing teachers with a structured, hands-on approach to developing action research. The program integrated foundational sessions on action research cycles, ethics, literature review, and research design with modules on responsible Generative AI use, aligning with contemporary initiatives emphasizing transparent and ethical technology integration in education. Through guided studio work, peer consultation, and iterative refinement, teachers were expected to produce a short action research proposal, an AI-use disclosure, and an ethics compliance checklist—outputs intended to strengthen their practical research competence. According to the program description, this initiative aims not only to enhance teachers' technical skills but also to cultivate reflective, ethical, and technology-literate educators capable of generating contextually relevant research for school improvement.

Although extensive research exists on the use of interactive media to support student learning, there remains limited empirical evidence on the effectiveness of teacher research capacity-building programs, particularly those integrating Generative AI within an action research framework. This gap suggests the need for systematic evaluation to understand how such training influences teachers' knowledge, confidence, and readiness to conduct action research. Therefore, this study aims to evaluate the effectiveness of the three-day seminar–workshop by assessing its impact on teachers' action research competence and their ability to utilize Generative AI responsibly in academic writing. By addressing this gap, the research contributes to ongoing efforts to strengthen teacher professionalism and advance a research-engaged school culture.

Methodology

Research Design

This study employs Action Research following the model introduced by Kemmis and McTaggart, which positions inquiry as a cyclical and reflective process oriented toward improving professional practice through systematic intervention. Action Research was selected as the methodological framework because the investigation focuses on enhancing teachers' competence in designing and conducting classroom-based research, as well as in using Generative AI tools responsibly. This design allows the researcher—serving simultaneously as facilitator and observer—to plan, implement, observe, and reflect on the seminar–workshop to

assess its effectiveness and identify areas for improvement (25).

The action research process in this study unfolded through a sequence of interconnected stages that aligned with the flow of the three-day seminar–workshop. It began with a planning phase, during which the facilitator designed the training sessions, prepared instructional materials, developed assessment tools, and organized guided studio activities to support participant learning. This was followed by the action phase, during which the seminar lectures, interactive workshops, peer-review exercises, and hands-on writing tasks were carried out as the primary mechanisms for delivering the intervention. The process then transitioned to observation and reflection, during which the facilitator monitored teacher engagement, assessed the quality of participant outputs, administered post-training assessments, and identified aspects of the program that required improvement or additional support. Figure 1 below shows the summary of the process.

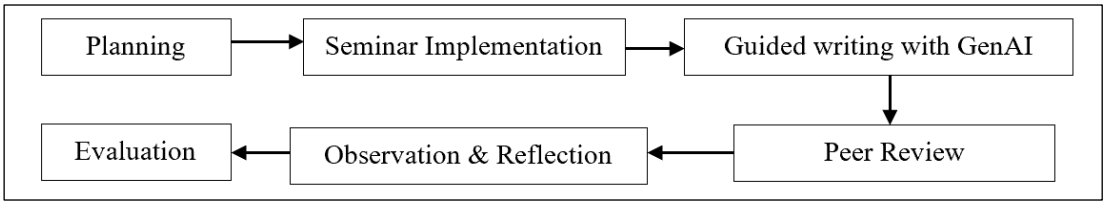

Figure 1: Action Research Workflow of the Seminar–workshop

Locale, Participants, and Sampling

The study was conducted at the Mindanao State University – Integrated Laboratory School (MSU-ILS) in Marawi City, a public basic education institution within the MSU System that regularly hosts professional development initiatives to strengthen instructional and research capacities among its teaching workforce. The school was selected as the research locale because it served as the official venue for the three-day seminar–workshop titled "Teachers' Action Research: Step-by-Step Design with Responsible Generative AI for Writing & Research," thereby providing a natural setting in which to evaluate the program's implementation and outcomes. The seminar was organized as part of the school's continuing efforts to cultivate a research-engaged culture and to enhance teachers' competence in both traditional and technology-supported research practices.

The participants in the study were MSU-ILS teachers who voluntarily registered for the seminar–workshop. These teachers represented various grade levels and subject areas, reflecting the diverse instructional roles within the institution. Participation was open to all full-time faculty members, and enrolment followed an institutional call for attendees disseminated through internal communication channels. Although the program accommodated a maximum of 30 teachers, the final number of participants reflected those who confirmed attendance and completed all workshop requirements, including the production of an action research proposal excerpt, an AI-use disclosure, and a research ethics and compliance checklist. Their voluntary participation ensured that the data gathered reflected genuine engagement and authentic learning experiences during the intervention.

A convenience sampling approach was employed, as the participants were naturally bounded within the training event and represented the actual group for whom the seminar–workshop was designed. This sampling method aligns with the principles of action research, which prioritize context-specific inquiry and the direct involvement of practitioners engaged in the improvement process. The final sample consisted of 28 teachers (71% female; mean teaching experience = 9.4 years). Participants represented elementary (43%), junior high (36%), and senior high school (21%) levels across multiple subject areas including sciences, humanities, and language education. Approximately 61% reported limited prior experience in conducting formal research, and 54% indicated initial unfamiliarity with structured GenAI integration in academic writing.

Research Instrument and Description of the Program

The intervention examined in this study was a three-day seminar–workshop entitled "Teachers' Action Research: Step-by-Step Design with Responsible Generative AI for Writing & Research," conducted at the Mindanao State University – Integrated Laboratory School (MSU-

ILS). The program was intentionally designed as a structured capacity-building initiative to enhance teachers' competence in conducting classroom-based action research while promoting the ethical and responsible use of Generative Artificial Intelligence (GenAI) in academic writing. The workshop followed a progressive and scaffolded structure, moving from foundational concepts to applied research outputs.

During the first phase of the program, participants were introduced to the core principles of action research, including its purpose, cyclical nature, and relevance to classroom improvement. Emphasis was placed on identifying context-based problems, formulating researchable questions, and understanding ethical considerations in school-based research. The second phase focused on research design and implementation, where teachers engaged in guided studio activities involving the development of research plans, selection of data collection tools, and basic approaches to data analysis. Peer consultation and facilitated feedback sessions were integrated to strengthen collaborative learning and reflective practice.

The final phase of the seminar–workshop focused on the responsible integration of Generative AI in academic research writing. Participants were oriented on the appropriate uses and limitations of GenAI tools, common ethical risks such as fabricated citations and unverifiable content, and the importance of transparency and disclosure. Teachers were guided in preparing three key outputs: a draft action research proposal, an AI-use disclosure statement, and a research ethics and compliance checklist. These outputs served both as learning artefacts and as evidence of applied competence developed through the program. Overall, the workshop was designed not only to build technical research skills but also to cultivate ethical awareness, reflective inquiry, and sustained readiness to conduct action research in authentic school contexts.

To evaluate the effectiveness of the seminar–workshop and address the objectives of the study, two structured self-report questionnaires were utilized as the primary research instruments. These instruments were developed specifically for the study and administered using a five-point Likert scale (ranging from 1 as Strongly Disagree to 2 as Strongly Agree). The first instrument, the Teachers' Action Research Competence Questionnaire (TARCQ), was designed to assess teachers' competence in conducting action research across three domains: knowledge, confidence, and readiness. The knowledge domain measured participants' understanding of action research concepts, procedures, ethics, and the supportive role of Generative AI in scholarly work. The confidence domain examined teachers' perceived self-efficacy in identifying research problems, designing studies, analyzing data, and completing action research projects. The readiness domain focused on teachers' willingness, preparedness, and intention to conduct action research and apply ethical and responsible GenAI practices in future research endeavors. The TARCQ consisted of 30 items, with ten items allocated to each domain, and served as the primary tool for assessing teachers' action research competence.

The second instrument, the Seminar–Workshop Effectiveness Questionnaire (SWEQ), was developed to evaluate participants' perceptions of the seminar–workshop's effectiveness. This instrument measured the program's impact across four domains: program content and structure; impact on action research competence; responsible use of Generative AI in academic writing; and overall effectiveness and application. The SWEQ consisted of 40 items designed to capture teachers' evaluations of the clarity, relevance, organization, and instructional value of the workshop, as well as its influence on their research skills, ethical awareness, and professional motivation. Responses to this instrument provided evidence of how the seminar–workshop contributed to teachers' learning experiences and practical application of action research and GenAI integration.

Prior to administration, both instruments underwent content validation by three experts in educational research and instructional design. Items were evaluated for clarity, relevance, and alignment with the domain. Minor revisions were made based on feedback. Internal consistency reliability testing yielded acceptable Cronbach's alpha coefficients: TARCQ ($\alpha = 0.89$) and SWEQ ($\alpha = 0.92$), indicating strong reliability.

Data Collection Technique

Data collection in this study employed multiple complementary techniques to generate a comprehensive understanding of the effectiveness

of the three-day seminar–workshop in enhancing teachers' action research competence. Observation was conducted throughout the workshop to document participants' engagement, interaction patterns, and the overall conduct of instructional activities. This process followed predetermined indicators designed to capture how teachers responded to seminar presentations, participated in guided studio tasks, and incorporated workshop concepts into their developing research outputs. Post-training assessments were administered at the conclusion of the program to measure participants' knowledge and understanding of action research foundations, ethical guidelines, and responsible Generative AI use, serving as quantitative indicators of learning gains resulting from the intervention.

Documentation techniques further complemented the data-gathering process by collecting participant artefacts, including draft action research proposals, AI-use disclosure logs, and completed research ethics and compliance checklists. These materials provided tangible evidence of how teachers applied the workshop principles and revealed the extent to which they internalized concepts related to research design, ethical practice, and the transparent use of Generative AI tools. The integration of observational records, assessment results, and participant-generated documents enabled a systematic, multidimensional evaluation of the workshop's impact, capturing both the learning process and its outcomes.

Ethical considerations were embedded throughout the data collection procedures in accordance with institutional guidelines for school-based research. Participation in the seminar, workshop, and study was voluntary, and all teachers were informed of the study's purpose, the types of data to be collected, and their right to withdraw at any point without penalty. No personal or sensitive information outside the scope of the research objectives was collected, and all data were anonymized during analysis to ensure confidentiality. Copies of participants' artefacts were obtained only with their consent and used exclusively for research purposes. The AI-use disclosure logs and ethics checklists submitted by participants were treated as academic outputs rather than evaluative records of personal performance, thereby safeguarding participant dignity and fostering a supportive learning environment. Data were stored securely in password-protected digital folders accessible only to the researcher. These ethical safeguards ensured compliance with institutional standards and reinforced the study's commitment to academic integrity, privacy, and responsible data handling within the action research framework.

Data Analysis Technique

The data analysis in this study employed a combination of qualitative and quantitative methods to provide a comprehensive understanding of the seminar–workshop's effectiveness in enhancing teachers' action research competence. Qualitative data obtained from observations and documentation were analyzed descriptively to identify emerging patterns in participant engagement, the nature of their interactions during workshop activities, and the extent to which they demonstrated the targeted skills throughout the training process. Observation notes were reviewed systematically to determine levels of participation, the clarity with which teachers applied the concepts presented in the sessions, and the challenges they encountered during guided studio tasks. These qualitative insights were further strengthened by examining participant-generated artefacts—including draft research proposals, AI-use disclosure logs, and ethics compliance checklists—which served as tangible indicators of how teachers translated workshop content into practice. The descriptive analysis focused on interpreting these artefacts in relation to the workshop's objectives, thereby enabling the researcher to evaluate the depth and accuracy of participants' understanding.

Quantitative data were derived from the post-training assessment administered at the end of the workshop. Assessment scores were tabulated and analyzed using simple statistical procedures, including frequency counts, percentages, and mean scores, to measure participants' levels of knowledge acquisition. These computations enabled the researcher to identify the proportion of teachers who achieved mastery in key domains, including action research foundations, problem formulation, methodological design, ethics, and responsible integration of Generative AI. By comparing performance patterns across these domains, the analysis provided insight into areas

of strength and those that may require additional instructional support in future training cycles.

Results

The empirical findings of the study are organized into two major components: teachers' action research competence and the perceived effectiveness of the three-day seminar–workshop. The first component examines teachers' competence across three domains—knowledge, confidence, and readiness—following their participation in the structured intervention. The second component evaluates the effectiveness of the seminar–workshop in terms of program content and structure, impact on action research competence, responsible use of Generative Artificial Intelligence in academic writing, and overall application to professional practice.

Part I: Teachers' Competence on Action Research

This section presents descriptive findings on teachers' action research competence across three domains: knowledge, confidence, and readiness. Table 1 presents descriptive statistics on teachers' competence in action research, focusing on knowledge. The overall weighted mean (M = 3.90) indicates agreement, reflecting a solid level of conceptual understanding across indicators. The highest-rated item was understanding how Generative Artificial Intelligence can support—but not replace—scholarly research work (M = 4.12, SD = 1.130), highlighting strong awareness of responsible AI integration. In contrast, comparatively lower mean scores were observed in identifying appropriate data collection methods (M = 3.72, SD = 1.173) and formulating researcha ble questions (M = 3.80, SD = 1.155), suggesting areas where further methodological reinforcement may be beneficial.

Table 2 displays the results concerning teachers' confidence in conducting action research. The overall weighted mean (M = 3.876) reflects agreement, indicating that participants generally feel capable of undertaking classroom-based inquiry. The highest confidence level was reported in using peer feedback to improve research work (M = 4.04, SD = 1.136), underscoring the value of collaborative workshop components. Meanwhile, relatively lower confidence was observed in analyzing quantitative or qualitative classroom data (M = 3.68, SD = 1.180), suggesting a need for deeper statistical and analytical training in future capacity-building programs.

Table 1: Teachers' Competence on Action Research in terms of Knowledge

Knowledge on Action Research	Mean	SD	Interpretation
I can clearly explain the concept and purpose of action research in an educational setting.	4.04	1.020	Agree
I can differentiate action research from other research approaches, such as experimental or descriptive research.	3.80	1.041	Agree
I understand the key stages of the action research cycle (planning, acting, observing, and reflecting).	3.96	1.060	Agree
I know how to identify a classroom-based problem suitable for action research.	4.04	1.060	Agree
I am familiar with the essential components of an action research proposal.	3.84	1.143	Agree
I understand how to formulate clear and researchable action research questions.	3.80	1.155	Agree
I know appropriate data collection methods commonly used in classroom-based action research.	3.72	1.173	Agree
I understand basic ethical principles involved in conducting action research with students.	3.84	1.106	Agree
I am aware of institutional or school guidelines related to conducting teacher research.	3.88	1.092	Agree
I understand how Generative AI can support, but not replace, scholarly research work.	4.12	1.130	Agree
Weighted Mean:	**3.90**		**Agree**

Table 2: Teachers' Competence in Action Research in terms of Confidence

Confidence in Action Research	Mean	SD	Interpretation
I feel confident identifying a relevant classroom issue that can be addressed through action research.	3.92	1.077	Agree
I am confident in formulating action research questions based on observed classroom problems.	3.96	1.060	Agree
I feel capable of designing a simple action research plan appropriate to my teaching context.	3.96	1.136	Agree
I am confident in selecting appropriate tools to collect data for action research.	3.84	1.143	Agree
I feel confident analyzing basic quantitative or qualitative data gathered from my classroom.	3.68	1.180	Agree
I am confident in writing the background and rationale of an action research study.	3.76	1.128	Agree
I feel confident in using feedback from peers or mentors to improve my research work.	4.04	1.136	Agree
I am confident in ensuring ethical compliance when conducting classroom-based research.	3.80	1.155	Agree
I feel confident using Generative AI tools responsibly to support my research writing.	3.92	1.077	Agree
I am confident that I can complete an action research project from planning to reflection.	3.88	1.092	Agree
Weighted Mean:	**3.876**		Agree

Table 3 summarizes teachers' readiness to conduct action research. The overall weighted mean (M = 3.892) indicates agreement, demonstrating a positive disposition toward implementing research in classroom settings. The highest-rated indicator was the intention to conduct at least one action research study in the future (M = 4.04, SD = 1.098), reflecting substantial motivational impact. Additionally, readiness to revise teaching practices based on research findings (M = 4.00, SD = 1.080) suggests openness to reflective and evidence-informed instructional improvement.

Table 3: Teachers' Competence on Action Research in terms of Readiness

Readiness for Action Research	Mean	SD	Interpretation
I am ready to conduct action research to improve my classroom practices.	3.88	1.166	Agree
I am willing to invest time and effort in planning and implementing action research.	3.96	1.060	Agree
I am prepared to collect and analyze classroom data for research purposes.	3.80	1.041	Agree
I am ready to apply ethical guidelines when conducting research with my students.	3.76	1.128	Agree
I am prepared to document and report the results of an action research study.	3.80	1.155	Agree
I am ready to use Generative AI tools responsibly and transparently in research writing.	3.92	1.077	Agree
I am willing to disclose how Generative AI was used in my research process.	3.84	1.106	Agree
I am prepared to revise my teaching practices based on action research findings.	4.00	1.080	Agree
I am ready to collaborate with colleagues in conducting or discussing action research.	3.92	1.077	Agree
I intend to conduct at least one action research study in my classroom in the future.	4.04	1.098	Agree
Weighted Mean:	**3.892**		Agree

Part II: Effectiveness of Seminar–workshop on Action Research

Part II presents the overall evaluation of the three-day seminar–workshop across four key dimensions: program content and structure, impact on action research competence, responsible use of Generative Artificial Intelligence in academic writing, and overall effectiveness and application. Table 4 presents participants' evaluations of the seminar–workshop regarding program content and structure. The overall weighted mean (M = 4.69) indicates strong agreement, reflecting high satisfaction with the organization and instructional design of the training. The highest-rated item was the overall structure supporting meaningful learning (M = 4.89, SD = .323), suggesting that session sequencing and coherence were particularly effective. Slightly lower, though still strongly positive, ratings were observed for time allocation per session (M = 4.50, SD = .707), suggesting room to extend specific workshop components.

Table 4: Effectiveness of Action Research Seminar–Workshop in terms of Program and Structure

Program Content and Structure	Mean	SD	Interpretation
The objectives of the seminar–workshop was clearly explained at the beginning of the program.	4.67	.485	Strongly Agree
The topics covered were relevant to my role as a classroom teacher.	4.83	.383	Strongly Agree
The sequence of sessions helped me understand action research step by step.	4.61	.608	Strongly Agree
The balance between lectures and hands-on activities was appropriate.	4.78	.428	Strongly Agree
The time allotted for each session was sufficient to achieve its objectives.	4.50	.707	Strongly Agree
The workshop activities reinforced the concepts discussed during the lectures.	4.56	.616	Strongly Agree
The materials provided (slides, templates, examples) helped learn action research.	4.78	.548	Strongly Agree
The seminar–workshop addressed real classroom issues encountered by teachers.	4.50	.618	Strongly Agree
The overall structure of the program supported meaningful learning.	4.89	.323	Strongly Agree
The seminar–workshop met my expectations as a professional development activity.	4.78	.548	Strongly Agree
Weighted Mean:	**4.69**		**Strongly Agree**

Table 5 shows the perceived impact of the seminar–workshop on teachers' action research competence. The overall weighted mean (M = 4.585) falls within the strongly agree range, indicating substantial perceived improvement. The highest ratings were observed for improved understanding of action research concepts (M = 4.78, SD = .428) and strengthened overall competence (M = 4.67, SD = .686). Comparatively lower ratings, though still strong, were noted in understanding data analysis procedures (M = 4.28, SD = .826), suggesting an area for expanded methodological emphasis in future workshops.

Table 5: Effectiveness of Action Research Seminar–Workshop in terms of Impact on Action Research Competence

Impact on Action Research Competence	Mean	SD	Interpretation
The seminar–workshop improved my understanding of action research concepts.	4.78	.428	Strongly Agree
I am now better able to identify a classroom problem suitable for action research.	4.61	.502	Strongly Agree
The workshop enhanced my ability to formulate action research questions.	4.50	.707	Strongly Agree
I can now design a basic action research plan more effectively than before.	4.61	.698	Strongly Agree

The seminar–workshop improved my ability to select appropriate data collection tools.	4.56	.705	Strongly Agree
I gained a clearer understanding of how to analyze data in action research.	4.28	.826	Strongly Agree
The guided writing activities helped me draft parts of an action research proposal.	4.56	.616	Strongly Agree
Peer discussions and feedback contributed to improving my research ideas.	4.61	.698	Strongly Agree
The workshop increased my confidence in conducting action research in my classroom.	4.67	.686	Strongly Agree
Overall, the seminar–workshop strengthened my competence in action research.	4.67	.686	Strongly Agree
Weighted Mean:	**4.585**		**Strongly Agree**

Table 6 presents teachers' evaluation of the seminar–workshop in promoting the responsible use of Generative Artificial Intelligence in academic writing. The overall weighted mean (M = 4.551) indicates strong agreement across indicators. The highest-rated item concerned clarity in the responsible use of AI (M = 4.78, SD = .548), reflecting effective communication of ethical guidelines. Although awareness of risks such as fabricated citations was rated highly (M = 4.39, SD = .698), relatively lower values were observed in preparing AI-use disclosure statements (M = 4.39, SD = .698), suggesting a need for continued practice in formal transparency documentation.

Table 6: Effectiveness of Action Research Seminar–Workshop in terms of Responsible Use of Generative AI in Academic Writing

Responsible Use of Generative AI in Academic Writing	**Mean**	**SD**	**Interpretation**
The seminar–workshop clarified how Generative AI can be used responsibly in academic writing.	4.78	.548	Strongly Agree
I now understand the limitations of Generative AI in research-related tasks.	4.61	.698	Strongly Agree
The workshop helped me recognize unethical uses of Generative AI in research.	4.56	.705	Strongly Agree
I learned how to verify and validate AI-generated content before using it.	4.67	.594	Strongly Agree
I am more aware of the risks of fabricated citations or information generated by AI.	4.39	.698	Strongly Agree
The seminar–workshop emphasized the importance of transparency in AI use.	4.61	.608	Strongly Agree
I can prepare an AI-use disclosure statement for my research outputs.	4.39	.698	Strongly Agree
I feel confident using Generative AI to support, but not replace, my academic writing.	4.44	.856	Strongly Agree
The ethical guidelines discussed influenced how I plan to use AI in future research.	4.50	.707	Strongly Agree
The seminar–workshop improved my ability to integrate Generative AI responsibly in action research writing.	4.56	.616	Strongly Agree
Weighted Mean:	**4.551**		**Strongly Agree**

Table 7 summarizes participants' overall evaluation of the seminar–workshop's effectiveness and application. The overall weighted mean (M = 4.722) indicates firm agreement, demonstrating high levels of satisfaction and perceived professional growth. The highest ratings were given to the overall achievement of workshop objectives (M = 4.83, SD = .383) and to the willingness to recommend the program to others (M = 4.83, SD = .383), reflecting strong endorsement. High motivation to apply acquired skills in classroom practice (M = 4.72, SD = .461) further underscores the training's practical relevance and immediate applicability.

Table 7: Effectiveness of Action Research Seminar–Workshop in terms of Overall Effectiveness and Application

Overall Effectiveness and Application	Mean	SD	Interpretation
The seminar–workshop prepared me to apply action research in my own classroom.	4.61	.608	Strongly Agree
I am motivated to complete an action research study after attending the workshop.	4.72	.461	Strongly Agree
I intend to apply what I learned in future research or school improvement activities.	4.72	.461	Strongly Agree
The skills gained from the workshop apply to my teaching context.	4.61	.608	Strongly Agree
I believe the seminar–workshop contributed to my professional growth.	4.78	.428	Strongly Agree
The training enhanced my awareness of ethical research practices in education.	4.67	.594	Strongly Agree
I would recommend this seminar–workshop to other teachers.	4.83	.383	Strongly Agree
The seminar–workshop supported my development as a reflective practitioner.	4.67	.485	Strongly Agree
The integration of Generative AI made the workshop more relevant and timely.	4.78	.428	Strongly Agree
Overall, the three-day seminar–workshop was effective in achieving its objectives.	4.83	.383	Strongly Agree
Weighted Mean:	**4.722**		**Strongly Agree**

Discussion

The findings of the present study demonstrate that teachers exhibited a positive level of competence in action research in terms of knowledge, confidence, and readiness after participating in the structured seminar–workshop, suggesting that targeted professional development can effectively strengthen research-related capabilities among educators. The overall agreement across all competence domains indicates that teachers possess a foundational understanding of action research processes, ethical considerations, and the supportive role of Generative AI, aligning with previous studies that emphasize the importance of systematic training in cultivating research literacy among practitioners. This result supports the assertion that action research competence is not innate but can be developed through intentional, scaffolded interventions embedded in professional learning contexts (1, 26).

In terms of knowledge, the high mean scores suggest that teachers developed a more precise conceptual grasp of action research cycles, proposal components, and ethical principles, which corroborates earlier findings that structured workshops significantly enhance teachers' theoretical understanding of classroom-based inquiry (27, 28). The strong agreement on items related to the appropriate role of Generative AI further reflects growing awareness among teachers regarding technology-assisted research practices, consistent with studies highlighting the expanding influence of digital tools in academic work (11, 14). This contrasts with earlier research reporting limited teacher familiarity with research concepts due to insufficient training, suggesting that the current intervention successfully addressed previously identified gaps (27, 29).

The confidence domain findings indicate that teachers felt capable of identifying research problems, designing action research plans, and completing research tasks, which aligns with literature emphasizing the role of guided practice and peer interaction in building research self-efficacy (4, 26, 30). The exceptionally high confidence in using peer feedback reflects the effectiveness of collaborative elements embedded in the seminar–workshop, echoing studies that highlight collegial learning as a key factor in strengthening professional competence (3, 4, 18). These results suggest that confidence in action research is reinforced not only by content mastery but also by supportive learning environments that encourage reflection and dialogue (1, 18).

Teachers' readiness to conduct action research also yielded positive results, indicating a strong willingness to apply research skills in classroom settings and engage in ethical research practices, which is consistent with findings that professional development programs can foster sustained research engagement among teachers (1, 26). The

high intention to conduct future action research suggests that the seminar–workshop influenced not only immediate learning outcomes but also teachers' long-term research orientation, supporting studies that identify readiness as a critical precursor to actual research implementation (21, 25). This finding contrasts with reports of teacher reluctance toward research activities when training lacks practical relevance, underscoring the importance of context-based interventions (5, 31).

The effectiveness results further reveal that participants strongly agreed on the clarity, relevance, and organization of the seminar–workshop, highlighting the importance of well-structured professional development programs in achieving meaningful learning outcomes (2, 32, 33). The high ratings for program content and structure mirror findings from action research studies demonstrating that coherent sequencing of sessions and integration of hands-on activities enhance participant engagement and comprehension (3). These results suggest that the scaffolded design of the workshop contributed substantially to its perceived effectiveness, reinforcing the value of intentional instructional planning in teacher training initiatives (2).

The seminar–workshop's substantial impact on action research competence aligns with prior research indicating that guided writing activities, peer feedback, and iterative refinement significantly improve teachers' ability to conceptualize and design research studies (1, 2). The consistently high agreement across competence-related items suggests that participants were able to translate workshop inputs into practical research outputs, supporting claims that action-oriented professional development promotes applied learning (16, 34). This finding contrasts with earlier studies that reported limited skill transfer from theory to practice, implying that the hands-on nature of the current program effectively bridged this gap (2, 35).

Notably, strong agreement on the responsible use of Generative AI in academic writing underscores the workshop's success in addressing ethical and practical concerns associated with emerging technologies, aligning with contemporary literature that emphasizes the need for explicit guidance on ethical AI integration in education (13, 16). Teachers' increased awareness of AI limitations, verification practices, and disclosure requirements reflects growing alignment with responsible technology frameworks advocated in recent educational research (9, 17). This finding is particularly significant given earlier concerns about AI misuse in academic contexts, suggesting that targeted training can mitigate ethical risks (7, 28).

Generally, the high ratings for overall effectiveness and application indicate that the seminar–workshop successfully motivated teachers to apply action research and responsible Generative AI use in their professional practice, supporting the argument that sustained professional development fosters research-engaged school cultures (1, 6, 36). The findings of the present study reinforce existing evidence that action research-oriented training enhances both competence and motivation among teachers when grounded in practical, ethical, and collaborative learning experiences (28, 37). Subsequently, the study contributes to the growing body of literature affirming that structured, technology-informed professional development initiatives can play a critical role in advancing teacher professionalism and evidence-based practice in contemporary educational settings (7, 28).

These findings are consistent with broader research demonstrating that structured professional development significantly enhances teacher research self-efficacy and applied competence (1, 32, 35). The integration of Generative AI within research-focused professional development situates this study within the expanding discourse on digital transformation in education. Unlike general technology integration models, the present intervention embedded AI literacy within research ethics and reflective practice, thereby aligning technological competence with pedagogical responsibility.

This study relied primarily on self-reported questionnaire data, which may introduce response bias, social desirability effects, and subjective overestimation of competence. Although participant artefacts and observational notes were used for triangulation, no pre-test/post-test experimental comparison or external performance-based evaluation was conducted. Additionally, the short duration of the intervention

limits conclusions regarding long-term retention and sustained research engagement. Future research may track teachers' completed action research outputs longitudinally following the workshop. Comparative experimental designs examining AI-integrated versus non-AI research training models are also recommended. Additionally, cross-institutional replication studies may assess contextual variability in outcomes.

Conclusion

This action research demonstrated that the three-day seminar–workshop effectively enhanced teachers' action research competence and their capacity to use Generative Artificial Intelligence responsibly in academic writing. Participants demonstrated positive gains in knowledge, confidence, and readiness to engage in classroom-based inquiry, confirming the value of structured, scaffolded professional development. High ratings across program content, structure, and overall effectiveness further indicate that integrating hands-on research training with explicit ethical guidance on GenAI supports the development of research-engaged and ethically grounded educators.

However, this study has limitations to acknowledge, such as reliance on self-reported questionnaire data in reporting their competence and capacity in using GenAI for action research, the limited number of participants, the short-term nature of the evaluation, and the specific association between action research and GenAI despite its broader nature. Also, the absence of a pre-test/post-test comparison or a control group limits causal inference about the intervention's impact.

Thus, the study recommends institutionalizing similar seminars and workshops as part of continuous professional development to strengthen teachers' research competence and ethical research practices. Educational institutions should adopt training models that integrate action research with responsible AI use to address evolving academic demands. Future initiatives may include extended guided practice and post-workshop mentoring to support implementation. While the findings are promising, conclusions should be interpreted cautiously due to reliance on self-reported measures and the short-term nature of the evaluation. Further longitudinal and experimental research is recommended to validate sustained impact.

Abbreviations

AI: Artificial Intelligence, GenAI: Generative Artificial Intelligence, ILS: Integrated Laboratory School, M: Mean, MSU: Mindanao State University, MSU-ILS: Mindanao State University – Integrated Laboratory School, SD: Standard Deviation, SWEQ: Seminar–Workshop Effectiveness Questionnaire, TARCQ: Teachers' Action Research Competence Questionnaire.

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Author Contributions

All authors contributed equally. All authors approved the final version of the manuscript for publication.

Conflict of Interest

The authors share no conflict of interest.

Data Availability

The data that support the findings of this study are not publicly available due to institutional confidentiality and participant privacy considerations, but are available from the corresponding author upon reasonable request and with permission from Mindanao State University – Integrated Laboratory School.

Declaration of Artificial Intelligence (AI) Assistance

During the preparation of this work, the authors used Generative Artificial Intelligence (GenAI) tools to assist in language refinement and structural organization. After using these tools, the authors reviewed and edited the content as needed and took full responsibility for the publication's content.

Ethics Approval

The study's ethical concerns were consulted, reviewed, and approved by the MSU-ILS research committee.

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