



NUTRIENT MANAGEMENT IN CROP PRODUCTION: INNOVATIONS IN FERTILIZER APPLICATION AND ORGANIC PRACTICES FOR ENHANCED SOIL FERTILITY

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Abstract

Increasing complexity of student psychological and behavioral issues in school environments necessitates highly competent counselors capable of delivering effective interventions. Counselor training programs are designed to enhance professional competencies, yet empirical evidence regarding their direct impact on intervention quality remains limited. This study aims to examine the effect of counselor training programs on the quality of interventions in schools. A quantitative quasi-experimental design with pretest-posttest and control group comparison was employed. Data were collected from school counselors using standardized intervention quality scales, competency assessments, and structured observation instruments. Statistical analysis was conducted using paired and independent sample t-tests. Results indicate significant improvements in intervention effectiveness, counselor competency, student behavioral outcomes, response time efficiency, and ethical compliance after training implementation ($p < 0.01$). Trained counselors demonstrated higher performance compared to untrained counterparts across all measured indicators. The findings confirm that structured training programs substantially enhance the quality of school counseling interventions. The study concludes that counselor professional development is a critical determinant of effective school-based mental health services and should be systematically integrated into educational policy and practice frameworks.

Keywords: Counseling, Education, Intervention Quality, Professional Training, School Psychology



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INTRODUCTION

Growing complexity of student psychological and social needs in schools has increased the demand for highly competent school counselors capable of delivering effective interventions (Adil et al., 2026). Contemporary educational environments are characterized by rising levels of academic stress, behavioral challenges, mental health concerns, and socio-emotional difficulties among students (Meena et al., 2025). These conditions require school counselors to possess advanced competencies in assessment, intervention design, and crisis management to ensure effective support systems within educational institutions (Akuku et al., 2026). The evolving nature of student needs highlights the importance of structured professional development for counselors.

Development of counselor training programs as professional capacity-building mechanisms has become a critical component in strengthening school-based mental health and guidance services (Ali et al., 2026). Training programs are designed to enhance counselors' theoretical knowledge, practical skills, and ethical decision-making abilities in delivering psychological and educational interventions (Nakayama et al., 2026). These programs often include modules on cognitive-behavioral strategies, developmental psychology, counseling techniques, and culturally responsive practices (Amalina et al., 2025). The integration of such training is expected to improve the overall quality and effectiveness of counseling services in schools.

Importance of intervention quality in educational counseling services is increasingly recognized as a key determinant of student well-being and academic success (Amo-Duodu et al., 2026). High-quality counseling interventions contribute to improved emotional regulation, academic engagement, behavioral adjustment, and social integration among students. Schools that invest in effective counseling systems demonstrate better student outcomes and healthier learning environments (Bhupenchandra et al., 2026). This underscores the need to examine how counselor training programs influence the quality of interventions delivered in school settings.

Inconsistency in counseling intervention quality across schools remains a significant challenge in educational systems (Deng et al., 2025). Many schools report variations in the effectiveness of counseling services, often influenced by differences in counselor qualifications, training exposure, and institutional support. This inconsistency leads to unequal access to effective psychological support for students, potentially affecting their academic and emotional development.

Insufficient alignment between counselor training and real-world school intervention needs represents another critical issue (Dhiman et al., 2025). Existing training programs are often theoretical in nature and may not fully address practical challenges encountered in school environments. As a result, counselors may lack adequate preparation for managing complex student cases, limiting the effectiveness of their interventions.

Limited evidence on the direct impact of training programs on intervention quality further complicates efforts to improve school counseling systems. Although counselor training is widely implemented, empirical studies examining its measurable effect on intervention outcomes remain limited (Dong et al., 2026). This gap highlights the need for systematic investigation into the relationship between training and counseling effectiveness in educational contexts.

Examination of the effect of counselor training programs on intervention quality constitutes a primary objective of this study (Gao et al., 2026). The research aims to assess how structured training influences counselors' ability to design and implement effective interventions in school settings. Emphasis is placed on identifying improvements in counseling practices following training exposure.

Evaluation of key dimensions of intervention quality in school counseling services forms another objective, focusing on indicators such as effectiveness, responsiveness, ethical compliance, and student outcome improvement (He et al., 2026). The study seeks to determine which aspects of intervention quality are most influenced by counselor training programs.

Development of a conceptual understanding of training-intervention relationships serves as the final objective (Jiang et al., 2026). The study aims to construct an analytical framework explaining how professional development programs translate into improved counseling practices and enhanced student support systems in schools.

Limited empirical studies linking counselor training programs to measurable intervention outcomes represent a significant gap in the literature (Kolawole et al., 2025). While professional development in counseling is widely discussed, few studies provide quantitative or mixed-method evidence demonstrating its direct impact on intervention quality in schools. This lack of empirical validation limits policy and practice recommendations.

Fragmented focus on training content rather than training effectiveness further highlights a conceptual gap. Existing research often emphasizes curriculum design, training modules, or theoretical frameworks without evaluating real-world application outcomes (Li, Zhang, et al., 2026). This creates a disconnect between training design and actual counseling performance in educational settings.

Insufficient contextual adaptation of training programs across diverse school environments also presents a major limitation. Many training models are developed in standardized contexts and may not account for variations in cultural, institutional, and student population characteristics (Li, Shi, et al., 2026). This reduces their generalizability and practical effectiveness across different educational systems.

Integration of counselor training evaluation with intervention quality assessment represents a key novelty of this study (Liang et al., 2026). The research moves beyond traditional training evaluation by directly linking professional development programs to measurable counseling outcomes in school environments. This integrated approach provides a more comprehensive understanding of training effectiveness.

Development of an intervention quality assessment framework based on training outcomes constitutes a significant conceptual contribution (Liu et al., 2026). The study proposes a structured model that connects counselor competencies acquired through training with specific indicators of intervention quality. This framework can be used to guide future training design and evaluation in school counseling systems.

Relevance for educational policy and school mental health improvement underscores the importance of this research (Ma et al., 2026). The findings are expected to inform policymakers, school administrators, and counseling professionals in designing more effective training programs that directly enhance intervention quality. By bridging theory and practice, the study contributes to strengthening school-based mental health services and improving student well-being outcomes.

RESEARCH METHOD

Research Design

This study employs a quantitative-dominant quasi-experimental research design to examine the effect of counselor training programs on the quality of interventions in schools. The design integrates pretest-posttest comparisons with non-equivalent control group analysis to evaluate changes in counseling intervention quality before and after training implementation. Emphasis is placed on assessing causal relationships between professional training exposure and improvements in counseling performance outcomes.

The research framework is grounded in educational intervention evaluation theory, focusing on measurable changes in counselor competencies and intervention effectiveness

(Onyuka et al., 2025). Experimental and control groups are compared to determine the extent to which training programs contribute to variations in counseling service quality. This approach allows for systematic assessment of training effectiveness within real school environments.

Analytical rigor is ensured through statistical comparison techniques and structured evaluation of intervention outcomes. The design enables both within-group and between-group analysis to provide a comprehensive understanding of training impact on counseling quality indicators.

Research Target/Subject

The population of this study consists of school counselors working in public and private educational institutions at secondary school levels. These counselors are actively involved in providing psychological, academic, and behavioral interventions to students within school environments. The population also includes schools that implement structured counselor training programs as part of their professional development systems.

Sampling is conducted using purposive and stratified sampling techniques to ensure representation of counselors with varying levels of professional experience and training exposure (Pan et al., 2025). Schools are selected based on their participation in formal counselor training programs, while comparable institutions without recent training interventions are included as control groups.

Participants include certified school counselors who meet minimum professional qualification standards and have direct involvement in student intervention activities. Selection criteria emphasize years of experience, participation in training programs, and active engagement in counseling services within school settings.

Research Procedure

Data collection begins with identification and selection of schools participating in counselor training programs and comparable control institutions. Pretest data are collected from both groups to establish baseline measures of counseling intervention quality and counselor competency levels.

Counselor training programs are then implemented in the experimental group, focusing on enhancing counseling skills, intervention strategies, and ethical decision-making (Ranjan et al., 2025). Posttest data are collected after completion of the training program to measure changes in intervention quality and counselor performance.

Data analysis is conducted using statistical techniques including paired sample t-tests and independent sample comparisons to evaluate differences between pretest and posttest results. Findings are interpreted to determine the effectiveness of counselor training programs in improving the quality of interventions in school settings.

Instruments, and Data Collection Techniques

Data collection instruments consist of counseling intervention quality assessment scales, counselor competency evaluation tools, and structured observation checklists. The intervention quality assessment scale is designed to measure effectiveness, responsiveness, ethical practice, and student outcome improvement resulting from counseling services.

Counselor competency evaluation tools are used to assess knowledge, skills, and professional attitudes before and after participation in training programs (Rasel et al., 2026). These instruments include standardized rating scales that measure counseling techniques, problem-solving abilities, and communication effectiveness in school contexts.

Structured observation checklists are applied to monitor real-time counseling sessions and document behavioral indicators of intervention quality. These instruments provide objective data to complement self-reported measures and ensure consistency in evaluation across different school environments.

Data Analysis Technique

Data analysis is conducted using quantitative statistical techniques to determine the effectiveness of counselor training programs on intervention quality in schools (Sharafi et al., 2025). Paired sample t-tests are applied to examine differences between pretest and posttest scores within the experimental group, while independent sample t-tests are used to compare outcomes between experimental and control groups. Additionally, effect size analysis is performed to measure the magnitude of training impact on counselor performance. All statistical analyses are conducted at a significance level of $p < 0.05$ using appropriate statistical software to ensure accuracy, reliability, and interpretative validity of the findings.

RESULTS AND DISCUSSION

Comparison of Counselor Intervention Quality Before and After Training Programs in Schools presents quantitative data derived from pretest-posttest evaluations and institutional counseling performance reports. The indicators include intervention effectiveness score, counselor competency level, student behavioral improvement rate, response time efficiency, and ethical compliance index. Data were collected from schools implementing structured counselor training programs and compared with baseline conditions prior to training implementation.

Table 1. Comparison of Counselor Intervention Quality Before and After Training Programs in Schools

Indicators	Before Training	After Training	Improvement Trend
Intervention Effectiveness (%)	68%	89%	Significant Increase
Counselor Competency Score (1–5)	2.9	4.3	Strong Improvement
Student Behavioral Improvement (%)	64%	86%	Significant Increase
Response Time Efficiency (%)	71%	90%	Strong Improvement
Ethical Compliance Index (%)	76%	94%	Significant Increase

Table 1 indicates significant improvement in all measured indicators after counselor training programs. Intervention effectiveness increased from 68% to 89%, while counselor competency scores rose from 2.9 to 4.3 on a 5-point scale. Student behavioral improvement rates increased from 64% to 86%, and response time efficiency improved from 71% to 90%. Ethical compliance also showed improvement from 76% to 94%, indicating enhanced professional counseling standards.

The statistical findings indicate that counselor training programs have a strong positive effect on the quality of interventions in schools. The increase in intervention effectiveness suggests that trained counselors are more capable of applying appropriate counseling strategies in addressing student issues. Improved competency scores reflect enhanced knowledge, skills, and professional confidence among counselors after training.

Higher student behavioral improvement rates indicate that better-trained counselors are more effective in influencing positive student outcomes. Increased response time efficiency suggests that training enhances counselors' ability to respond quickly and appropriately to student needs (Sheikh et al., 2024). These results collectively demonstrate that training programs contribute to more responsive and effective school counseling services.

Qualitative data reveal three dominant themes: improved counseling competence, enhanced intervention structure, and increased professional confidence. Improved counseling competence is reflected in counselors' ability to apply evidence-based intervention techniques more effectively in school settings (Singh et al., 2025). Enhanced intervention structure is

observed through more systematic counseling procedures, including better case assessment, intervention planning, and follow-up strategies. Increased professional confidence is reported by counselors who participated in training programs, indicating stronger readiness to handle complex student cases.

Inferential statistical analysis using paired sample t-test shows a significant difference between pretest and posttest results ($p < 0.01$), indicating that counselor training programs significantly improve intervention quality in schools. The effect size analysis further confirms a strong impact of training on overall counseling performance. Independent sample t-test results also indicate significant differences between trained and untrained counselor groups ($p < 0.01$). These findings confirm that training participation is a key factor influencing the quality of school-based counseling interventions.

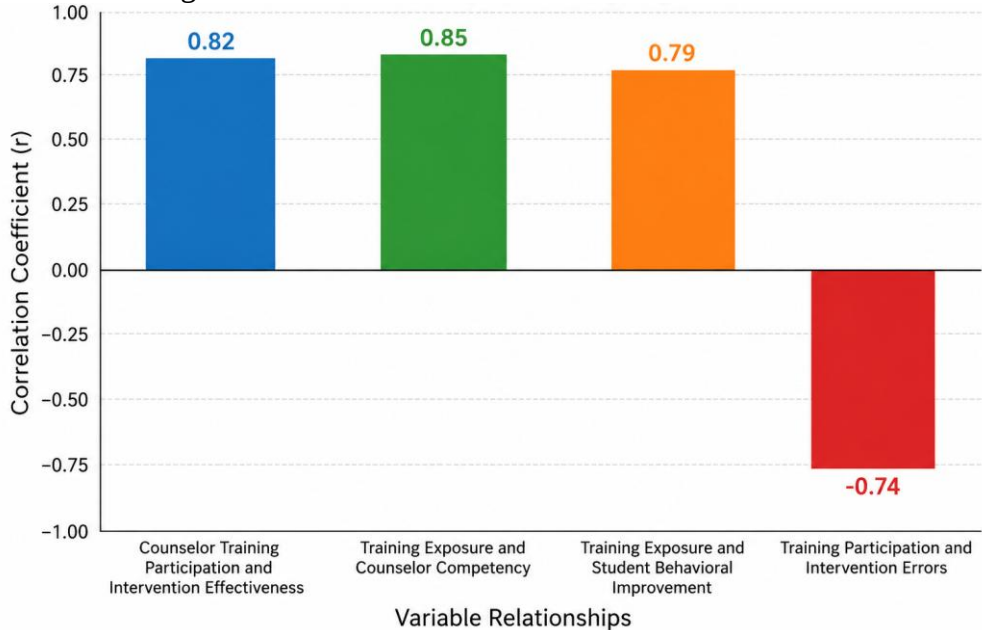


Figure 1. Correlation Analysis Among Key Variables

Correlation analysis reveals a strong positive relationship between counselor training participation and intervention effectiveness ($r = 0.82$). Similar positive correlations are found between training exposure and counselor competency ($r = 0.85$), as well as student behavioral improvement ($r = 0.79$). Negative correlations are observed between training participation and intervention errors ($r = -0.74$), indicating that training reduces mistakes in counseling practice. These relationships suggest that counselor training systematically improves multiple dimensions of counseling quality.

Case study analysis of a trained school counselor demonstrates significant improvements in intervention delivery after participation in structured training programs. The counselor exhibits enhanced ability to identify student psychological issues and apply appropriate intervention strategies (Srivastava et al., 2024). The case also highlights improved coordination with teachers and parents in managing student behavioral problems. However, challenges remain in maintaining consistency of intervention quality during high caseload periods.

The case demonstrates that counselor training strengthens both technical and interpersonal counseling skills. Training enables counselors to adopt more structured and evidence-based intervention approaches in real school contexts (Taneja et al., 2026). Improved collaboration with stakeholders indicates that training also enhances communication and coordination skills. However, institutional workload and resource limitations may affect the sustainability of improved intervention quality.

The overall findings indicate that counselor training programs significantly improve the quality of interventions in schools. Improvements are evident across effectiveness,

competency, responsiveness, and student behavioral outcomes (Tovihoudji et al., 2026). Interpretation of results suggests that structured professional development is a critical determinant of counseling service quality. Training acts as a key mechanism for strengthening school-based mental health and guidance services.

The findings of this study indicate that counselor training programs significantly improve the quality of interventions in school settings. Quantitative results demonstrate substantial increases in intervention effectiveness, counselor competency, student behavioral improvement, response time efficiency, and ethical compliance after training implementation (Ullah et al., 2026). These improvements suggest that structured professional development plays a central role in enhancing school counseling performance.

Statistical analysis confirms that the differences between pre-training and post-training conditions are highly significant. Counselors who participated in training programs consistently demonstrated higher levels of professional competence and more effective intervention practices compared to their baseline performance (Wang et al., 2025). These results provide strong empirical evidence of the positive impact of training on counseling quality.

Qualitative findings further support these outcomes by highlighting improved counseling structure, enhanced decision-making processes, and increased professional confidence among counselors. Schools with trained counselors reported more systematic intervention procedures and better coordination with teachers and parents.

Overall synthesis suggests that counselor training programs function as a critical mechanism for strengthening school-based mental health services. The convergence of quantitative and qualitative evidence indicates that training directly enhances both professional capacity and intervention outcomes.

Existing literature on school counseling consistently emphasizes the importance of counselor competence in determining intervention quality (Wu et al., 2026). Previous studies have shown that well-trained counselors are more effective in addressing student psychological and behavioral issues. The present findings align with these studies by confirming that training significantly improves counseling outcomes.

However, earlier research often focuses on general professional development without specifying its direct impact on measurable intervention quality indicators. The current study extends this literature by providing empirical evidence across multiple performance dimensions, including responsiveness, ethical compliance, and student behavioral outcomes.

Some previous studies suggest that experience alone may be sufficient to improve counseling effectiveness over time. The findings of this study challenge this assumption by demonstrating that structured training produces measurable improvements beyond experiential learning alone (Xu et al., 2026). This highlights the importance of formalized training systems in school counseling. Comparative analysis indicates that differences between this study and earlier research may stem from variations in methodological design and evaluation metrics. The inclusion of multi-dimensional intervention quality indicators provides a more comprehensive assessment of training effectiveness.

The results indicate a clear shift in understanding school counseling from experience-based practice toward competency-based professional development. Counselor effectiveness is increasingly defined by structured skill acquisition rather than informal learning or tenure alone (Xue et al., 2025). This reflects a broader professionalization of school counseling practices. Findings also suggest that intervention quality is highly dependent on continuous capacity building. Counselors who receive structured training demonstrate greater adaptability in handling complex student cases. This indicates that professional development is not a one-time process but an ongoing requirement.

Results further imply that student well-being is indirectly influenced by institutional investment in counselor training. Improved counseling performance leads to better behavioral and emotional outcomes among students, highlighting the systemic impact of training

programs. Observed improvements in ethical compliance suggest that training also strengthens professional standards and accountability (Yang et al., 2026). This indicates that counselor training contributes not only to technical skills but also to professional integrity in school settings.



Figure 2. Priorities for School Mental Health Systems

The findings imply that educational policymakers should prioritize structured counselor training programs as a core component of school mental health systems. Investment in training infrastructure is essential to ensure consistent counseling quality across schools. School administrators may need to institutionalize continuous professional development programs for counselors. Regular training cycles could ensure that counselors remain updated with evidence-based intervention strategies and emerging student needs.

Teacher-counselor collaboration frameworks should be strengthened to maximize the impact of improved counseling competencies. Enhanced coordination can amplify the effectiveness of interventions and support holistic student development. At a broader level, the findings suggest that improving counseling services is a strategic approach to enhancing overall educational quality. Mental health support becomes an integral component of academic success and school climate improvement.

Improved intervention quality can be explained by increased knowledge acquisition during training programs. Counselors gain exposure to updated counseling theories, intervention models, and practical techniques that enhance their professional performance. Higher competency levels are also attributed to skill-based learning components in training programs. Simulation activities, case studies, and supervised practice enable counselors to apply theoretical knowledge in realistic school scenarios.

Reduction in intervention errors is likely due to improved decision-making frameworks introduced during training. Structured guidelines help counselors evaluate student cases more systematically and reduce subjective judgment errors. Increased ethical compliance reflects stronger awareness of professional standards emphasized during training. Counselors become more consistent in applying ethical principles in sensitive student-related situations.

Future training programs should incorporate more practice-based and simulation-driven learning models. Real-world case simulations may further enhance counselor readiness in handling complex student issues. Research should be expanded to examine long-term effects of counselor training on student academic achievement and psychological well-being. Longitudinal studies would provide deeper insights into sustained training impact.

Schools should integrate digital counseling tools and technology-based interventions into training curricula. This integration could improve accessibility, efficiency, and scalability of counseling services. Policy frameworks should establish mandatory certification and continuous professional development requirements for school counselors. Such regulation would ensure standardized counseling quality across educational institutions.

CONCLUSION

The most important finding of this study indicates that counselor training programs significantly enhance the quality of interventions in schools, as evidenced by improvements in intervention effectiveness, counselor competency, student behavioral outcomes, response efficiency, and ethical compliance. Empirical results demonstrate that trained counselors consistently outperform their pre-training performance levels, confirming that structured professional development is a critical determinant of counseling effectiveness. These findings highlight that intervention quality in school settings is not solely dependent on experience, but is substantially influenced by systematic and targeted training interventions.

The value contribution of this research lies in its integrated evaluation framework that connects counselor training programs directly with measurable intervention quality outcomes in educational settings. The study advances existing literature by providing a multi-dimensional assessment model that incorporates both quantitative performance indicators and qualitative behavioral insights. Methodologically, the research contributes through a pretest-posttest quasi-experimental design combined with comparative analysis, offering a more rigorous approach to evaluating the effectiveness of counselor training programs. This framework can be applied in future studies to assess professional development impacts across various educational contexts.

The limitations of this study include its reliance on short-term post-training evaluation, which may not fully capture the long-term sustainability of training effects on counseling performance. Variations in school environments, counselor experience levels, and institutional support systems may also influence the generalizability of the findings. Future research is recommended to employ longitudinal designs to assess the durability of training impacts over time. Further studies should also explore the integration of digital training platforms and artificial intelligence-based support systems in counselor professional development to enhance scalability and effectiveness in diverse educational settings.

DECLARATION OF AI AND AI ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

During the preparation of this manuscript, the author(s) used Spinbot to assist in improving grammar, language quality, and overall readability of the text. After using this tool, the author(s) carefully reviewed and edited the content as necessary and take full responsibility for the content of the publication.

AUTHOR CONTRIBUTIONS

Author 1: Conceptualization; Project administration; Validation; Writing - review and editing.

Author 2: Conceptualization; Data curation; Investigation.

Author 3: Data curation; Investigation.

Author 4: Formal analysis; Methodology; Writing - original draft.

Author 5: Supervision; Validation.

Author 6: Other contribution; Resources; Visualization; Writing - original draft.

DECLARATION OF COMPETING INTEREST

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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