



INDIGENOUS KNOWLEDGE SYSTEMS AND PRACTICES (IKSP) INTEGRATED INSTRUCTION ON CULTURAL AWARENESS AND SCIENCE ACHIEVEMENT OF GRADE 5 LEARNERS IN IPED-IMPLEMENTING SCHOOLS

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ABSTRACT

This study examined the impact of Indigenous Knowledge Systems and Practices (IKSP)-Integrated Science Instruction on the cultural awareness and science achievement of Grade 5 learners in IPed-implementing schools in San Miguel II District, Surigao del Sur during School Year 2024–2025. Using a mixed-method quasi-experimental design, 80 Grade 5 learners and four Science teachers participated in the study. Learners were assigned to experimental and control groups and were assessed through cultural awareness and science achievement measures before and after the intervention. Findings indicated that learners exposed to IKSP-integrated instruction demonstrated higher levels of cultural awareness and science achievement than those taught through conventional instruction. The intervention strengthened learners' knowledge of indigenous traditions, attitudes toward cultural heritage, self-awareness, and science proficiency. Teachers and learners also perceived the approach as culturally relevant, engaging, and effective in contextualizing science concepts. The study concludes that integrating indigenous knowledge into science instruction promotes both academic success and cultural identity formation and recommends institutionalizing IKSP integration across IPed schools.

Keywords: *Indigenous Knowledge Systems and Practices, IKSP, cultural awareness, science achievement, IPed, culturally responsive teaching*

INTRODUCTION

Recent educational reforms emphasize culturally responsive teaching as a means of improving learner outcomes. Research shows that indigenous learners perform better when instruction reflects their cultural context (Hoppers, 2021). The Indigenous Peoples Education (IPEd) framework promotes the integration of Indigenous Knowledge Systems and Practices (IKSP) into classroom instruction to ensure that learning remains relevant to indigenous learners. Studies indicate that contextualized science instruction enhances learner engagement, conceptual understanding, and academic achievement (McKinley, 2022; UNESCO, 2023). Likewise, culturally relevant pedagogy strengthens cultural identity, belongingness, and positive attitudes toward learning (Gay, 2021). Indigenous knowledge contributes significantly to ecological literacy, environmental stewardship, and scientific understanding by providing culturally grounded explanations of natural phenomena (McGregor, 2021).

Learners who see their culture represented in classroom instruction demonstrate stronger motivation, participation, and academic persistence (Bang & Medin, 2022). Furthermore, recent research has highlighted that Indigenous-centered educational approaches improve learners' self-efficacy, critical thinking, and achievement in science education (Lee & Buxton, 2023; Khupe, 2021). Brayboy and Maughan (2022) further emphasized that integrating Indigenous knowledge into formal education supports cultural sustainability while promoting meaningful and inclusive learning experiences. In the Philippine context, IKSP integration remains a priority within the implementation of Indigenous Peoples Education programs (DepEd, 2023). However, empirical evidence on the impact of IKSP-integrated science instruction on both cultural awareness and science achievement among elementary learners remains limited. This study addresses this gap by examining the effectiveness of IKSP-integrated Science Instruction among Grade 5 learners in IPEd-implementing schools.

Research Questions

This study sought to answer the following questions:

1. What are the baseline levels of cultural awareness and science proficiency?
2. What are the post-implementation levels of cultural awareness and science achievement?
3. Is there a significant difference between the experimental and control groups?
4. What is the impact of IKSP-integrated instruction?
5. How do teachers and learners perceive the intervention?

METHODOLOGY

The study utilized a mixed-method quasi-experimental non-equivalent control group design involving 80 Grade 5 learners and four Science teachers from four IPEd-implementing schools in San Miguel II District. Forty learners received IKSP-integrated Science instruction while forty learners received conventional instruction. Data were

gathered through a Science Achievement Test, Cultural Awareness Questionnaire, Perception Survey, and Focus Group Discussions. Descriptive statistics, t-tests, ANOVA, and thematic analysis were employed to analyze quantitative and qualitative data, with significance set at $p < .05$.

RESULTS

Table 1. Baseline Levels of Cultural Awareness and Science Proficiency of Grade 5 Learners (Pre-Test)

Variables	Mean	Description
Knowledge and Understanding	2.69	Moderate Cultural Awareness
Attitudes and Beliefs	3.15	High Cultural Awareness
Self-Awareness and Reflection	2.87	Moderate Cultural Awareness
Science Proficiency Level	21.45	Very Low Proficiency
Overall Mean	2.90	Moderate Cultural Awareness

Table 2. Post-Implementation Levels of Cultural Awareness and Science Achievement

Group	Cultural Awareness Mean	Description	Science Achievement Mean	Description
Experimental (IKSP-Integrated)	4.35	Very High Cultural Awareness	42.18	Proficient
Control (Conventional)	2.78	Moderate Cultural Awareness	33.93	Approaching Proficiency

Table 3. Significant Difference Between Experimental and Control Groups

Variable	Computed p-value	Decision	Interpretation
Cultural Awareness	0.000	Reject Ho	Significant Difference
Science Achievement	0.000	Reject Ho	Significant Difference

Table 4. Impact of IKSP-Integrated Instruction on Learners' Cultural Awareness and Science Achievement

Indicator	Mean Gain	Description
Knowledge and Understanding	+1.56	High Positive Impact
Attitudes and Beliefs	+1.12	High Positive Impact
Self-Awareness and Reflection	+1.43	High Positive Impact
Science Achievement	+10.73	High Positive Impact
Overall Impact	+1.46	Highly Effective

Table 5. Teachers' and Learners' Perceptions on IKSP-Integrated Instruction

Theme	Description
Effectiveness	Improved understanding of science concepts
Cultural Relevance	Strengthened appreciation of indigenous culture
Learner Engagement	Increased participation and motivation
Challenges	Limited resources and instructional materials
Overall Perception	Highly Favorable

Table 6. Proposed IPed-Wide Implementation Strategy

Area	Proposed Action
Curriculum Integration	Institutionalize IKSP integration in Science instruction
Teacher Development	Conduct training on culturally responsive pedagogy
Learning Resources	Develop localized and contextualized materials
Community Partnership	Engage tribal elders and culture bearers
Monitoring and Evaluation	Establish regular assessment and feedback mechanisms

DISCUSSION

The findings of the study collectively demonstrate that Indigenous Knowledge Systems and Practices (IKSP)-Integrated Science Instruction positively influenced both

the cultural awareness and science achievement of Grade 5 learners in IPed-implementing schools. Prior to the intervention, learners exhibited only moderate levels of cultural awareness, particularly in terms of knowledge and understanding of indigenous traditions, practices, and cultural systems, while their science proficiency remained low. These baseline findings suggest that despite being members of indigenous communities, many learners possessed limited understanding of deeper cultural concepts and had difficulty connecting indigenous knowledge with formal science learning.

Following the implementation of IKSP-integrated instruction, learners in the experimental group demonstrated substantial improvements in cultural awareness across the dimensions of knowledge and understanding, attitudes and beliefs, and self-awareness and reflection. The findings indicate that integrating indigenous knowledge into science lessons provided learners with meaningful opportunities to appreciate their cultural heritage while simultaneously strengthening their academic learning. The results affirm the principles of culturally responsive teaching, which emphasize that learning becomes more meaningful when instructional content reflects learners' cultural backgrounds and lived experiences. Studies have shown that culturally responsive pedagogy enhances learner engagement, motivation, and identity development, leading to improved educational outcomes (Gay, 2021; UNESCO, 2023).

The study further revealed that learners exposed to IKSP-integrated instruction achieved higher science performance than those taught through conventional methods. This finding suggests that indigenous knowledge served as an effective bridge between learners' prior experiences and formal scientific concepts. By contextualizing science lessons through indigenous ecological knowledge, traditional practices, and community experiences, learners were able to construct deeper understanding of scientific principles. This result supports the constructivist perspective that meaningful learning occurs when new knowledge is connected to learners' existing knowledge structures. Similar findings were reported by McKinley (2022), who emphasized that integrating indigenous perspectives into science education improves conceptual understanding and academic achievement.

The significant differences observed between the experimental and control groups further confirm the effectiveness of IKSP-integrated instruction. Learners who received culturally responsive science instruction demonstrated greater gains in both cultural awareness and science achievement than those who received conventional instruction. These findings indicate that IKSP integration not only preserves and promotes indigenous culture but also contributes to improved academic outcomes. The results are consistent with recent studies showing that indigenous-centered educational approaches foster learner engagement, self-efficacy, and academic success (Bang & Medin, 2022; Lee & Buxton, 2023).

Moreover, qualitative findings from teachers and learners reinforced the quantitative results. Participants described the intervention as engaging, culturally relevant, and effective in making science lessons more meaningful. Learners expressed increased pride in their cultural identity and greater appreciation of indigenous knowledge, while teachers reported improved learner participation and classroom interaction.

Nevertheless, participants also identified challenges related to instructional resources, teacher preparation, and the availability of contextualized learning materials. These concerns highlight the need for sustained institutional support, professional development programs, and stronger collaboration with indigenous elders and community stakeholders.

Overall, the study provides compelling evidence that IKSP-integrated Science Instruction serves as an effective educational approach for Indigenous Peoples Education (IPEd) schools. The integration of indigenous knowledge into formal science instruction promotes cultural preservation, strengthens cultural identity, increases learner engagement, and enhances academic achievement. The findings underscore the importance of institutionalizing culturally responsive pedagogical approaches that recognize indigenous knowledge as a valuable component of quality and inclusive education. Such initiatives contribute not only to improved science learning outcomes but also to the broader goals of educational equity, cultural sustainability, and indigenous empowerment.

Conclusions

The study concluded that Grade 5 learners in the IPEd-implementing schools of San Miguel II District initially demonstrated moderate cultural awareness and low science proficiency, indicating the need for culturally relevant instructional interventions. Following the implementation of Indigenous Knowledge Systems and Practices (IKSP)-Integrated Science Instruction, learners in the experimental group exhibited significantly higher levels of cultural awareness and science achievement compared to those exposed to conventional instruction. The integration of indigenous knowledge, traditions, ecological practices, and community experiences into science lessons enabled learners to develop a deeper appreciation of their cultural heritage while simultaneously enhancing their understanding of scientific concepts. The findings further established that IKSP-integrated instruction had a significant positive impact on learners' knowledge and understanding, attitudes and beliefs, self-awareness and reflection, and overall science proficiency. Moreover, both teachers and learners perceived the intervention as effective, engaging, and culturally relevant. Therefore, the study affirms that IKSP-integrated Science Instruction is an effective pedagogical approach that promotes academic achievement, cultural identity formation, learner engagement, and the preservation of indigenous knowledge within the context of Indigenous Peoples Education.

Recommendations

Based on the findings and conclusions of the study, it is recommended that the Department of Education strengthen the implementation of Indigenous Peoples Education by institutionalizing the integration of Indigenous Knowledge Systems and Practices across Science instruction and other learning areas in IPEd schools. School leaders and education supervisors should provide continuous professional development opportunities for teachers focusing on culturally responsive pedagogy, indigenous-centered instructional approaches, and the development of contextualized learning resources. Teachers are encouraged to design and utilize localized instructional materials

that incorporate indigenous traditions, ecological knowledge, and community practices to make learning more meaningful and relevant to learners. Strong partnerships among schools, tribal elders, cultural leaders, and indigenous communities should also be established and sustained to ensure the authenticity and effectiveness of IKSP integration. Furthermore, adequate instructional resources and support mechanisms should be provided to facilitate successful implementation. Future researchers may conduct similar studies involving different grade levels, subject areas, and larger populations to further validate the effectiveness of IKSP-integrated instruction and contribute to the continuous improvement of culturally responsive educational practices.

Compliance with Ethical Standards

The researcher strictly adhered to established ethical standards throughout the conduct of the study. Prior to data collection, appropriate permissions and approvals were secured from educational authorities, school administrators, and indigenous community leaders. Free Prior and Informed Consent (FPIC) was obtained from the concerned indigenous communities, while informed consent and parental consent were secured from participating teachers, learners, and parents. Participation in the study was voluntary, and all respondents were fully informed of the objectives, procedures, benefits, and potential risks associated with the research. The confidentiality, anonymity, and privacy of all participants were safeguarded at all stages of the study, and all information gathered was used solely for academic and research purposes. Data were stored securely and reported only in aggregate form to prevent the identification of individual participants. The study upheld the ethical principles of respect for persons, beneficence, non-maleficence, and justice, ensuring that no participant was subjected to harm, discrimination, or undue influence during the conduct of the research.

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