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STUDENTS' LEARNING ACHIEVEMENT AND RETENTION THROUGH EXPERIENTIAL LEARNING IN ICT

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ABSTRACT

This study examines the impact of experiential learning on the learning achievement and retention of Grade 9 students of Valencia National High School in Information and Communication Technology (ICT). Experiential learning, which emphasizes learning through direct experience, active participation, and reflection, was utilized as a teaching approach to enhance students' understanding of ICT concepts and skills. The students were exposed to hands-on activities, real-world tasks, and collaborative projects that allowed them to apply theoretical knowledge in practical situations. A quasi-experimental research design was employed, comparing the performance of students exposed to experiential learning with those taught using traditional instructional methods. Data were gathered through pre-tests and post-tests to measure learning achievement, as well as retention tests administered after a specific period to assess long-term knowledge retention.

The findings revealed that Grade 9 students who engaged in experiential learning demonstrated significantly higher learning achievement and better retention compared to those who experienced conventional teaching methods. The results indicate that experiential learning enhances student engagement, critical thinking, and the ability to retain ICT concepts over time.

Based on the findings, it is recommended that educators in Valencia National High School integrate experiential learning strategies into ICT instruction to improve students' academic performance and long-term retention of knowledge. Further research may be conducted to explore its effectiveness in other subject areas and grade levels.

KEYWORDS: Experiential Learning, Learning Achievement, Knowledge Retention, Information and Communication Technology (ICT), Grade 9 Students, Valencia National

High School, Quasi-Experimental Design, Teaching Strategies, Student Engagement, Academic Performance

INTRODUCTION

Global trade, communication, and education have all undergone significant change as a result of the quick development of digital technologies. As a result, information and communication technology (ICT) literacy has evolved from a supplemental ability to a core competency necessary for success in the academic and professional environments of the twenty-first century (UNESCO, 2023). Moving beyond the academic understanding of ICT principles and toward the development of applied, practical competence is becoming increasingly important in educational settings. This change acknowledges that students must actively and skillfully use technology to solve problems in order to truly learn in a technologically advanced environment.

Traditional pedagogical approaches in ICT education often rely heavily on lecture-based instruction and rote memorization of concepts and terminologies. While these methods can facilitate knowledge acquisition, they are frequently criticized for failing to foster deeper cognitive skills and practical application (Johnson & Smith, 2021). Although existing literature has widely established the general benefits of experiential learning, there is a critical need for empirical investigation into the specific, multifaceted impact of hands-on experiences of ICT concepts—such as coding projects, network simulations, or database management tasks—on student outcomes. Specifically, the relationship between these practical experiences and long-term knowledge retention in a unified study remains underexplored.

The primary purpose of this research is to explore the efficacy of experiential learning integrated with a scaffolding technique to determine and analyze the impact of hands-on, practical implementation of ICT concepts in enhancing students' learning experience among Grade 9 learners of Valencia National High School. This study aims to quantify and describe how this experiential approach influences two distinct outcomes: (1) Learning Achievement, as measured by pretest and post-test to provide evidence of a positive link between students' involvement in experience-based learning methods and their level of achievement; and (2) Retention of ICT-related Knowledge over an extended period. The findings will provide educational stakeholders, curriculum developers, and ICT instructors with evidence-based data necessary to design pedagogical strategies that maximize student readiness for real-world application. This study is significant for multiple educational and practical reasons.

First, it provides empirical evidence on the effectiveness of hands-on ICT learning combined with scaffolding techniques, offering actionable insights for teachers seeking to move beyond traditional lecture-based methods. By demonstrating the relationship between experiential learning and measurable outcomes such as achievement and knowledge retention, the study highlights strategies that can make ICT instruction more meaningful and relevant to students.

Second, the research contributes to curriculum development and policy-making within schools implementing the K to 12 program. Insights from this study can guide the integration of practical ICT activities into lesson plans, ensuring that students acquire skills that are not only theoretically sound but also applicable in real-world contexts.

Finally, the study has broader implications for educational equity and student readiness. By identifying effective pedagogical approaches, the findings may help educators design instruction that engages diverse learners, fosters critical thinking, and supports long-term retention of skills, thereby preparing students to thrive in technology-driven environments and future career pathways. Ultimately, this research bridges the gap between theory and practice in ICT education, emphasizing the importance of active learning in preparing competent, confident, and adaptable learners.

Theoretical Framework of the Study

The present study, which investigates the influence of the Scaffolding Technique under Experiential Learning (EL) on the Learning Achievement, Engagement, and Retention of Grade 9 ICT learners, is anchored by a synergistic integration of two major pedagogical theories: Lev Vygotsky's Sociocultural Theory of Development, which provides the foundation for the Scaffolding Technique, and David Kolb's Experiential Learning Theory (ELT), which dictates the structure of the learning environment. These theories, when combined, create a robust conceptual model for optimizing learning in a procedural and problem-solving domain like Information and Communication Technology (ICT).

Vygotsky’s theory, particularly the concept of the Zone of Proximal Development (ZPD), posits that learning occurs most efficiently when a learner is guided by a More Knowledgeable Other (MKO)—in this case, the teacher or an advanced peer—to accomplish tasks that are just beyond their current independent capability (Vygotsky, 1978). This guidance, known as scaffolding, involves temporary, adjustable, and task-specific support that is systematically withdrawn as the learner develops mastery. In the complex, skill-heavy context of ICT, where tasks often involve debugging code, troubleshooting network configurations, or designing intricate digital systems, scaffolding is not merely helpful; it is essential to prevent cognitive overload and subsequent disengagement.

Recent research highlights the importance of scaffolding in digital learning environments. Al Mamun et al. (2020) emphasized that scaffolded instruction improves students' ability to complete complex tasks independently over time. In ICT education, where learners often encounter technical challenges, structured guidance helps reduce confusion and enhances learning efficiency. Furthermore, Lai and Hwang (2019) found that scaffolding supports self-regulated learning, enabling students to take greater control of their learning process.

By structuring complex ICT tasks into manageable, sequenced steps and providing focused hints (e.g., checklists for debugging, template codes, or guided prompts for reflection), scaffolding ensures that students successfully navigate challenging procedural knowledge, thereby directly translating effort into measurable learning achievement (Wood, Bruner, & Ross, 1976). The core tenet here is that the intervention prevents the learner from getting lost in the problem, enabling productive struggle that ultimately leads to the internalization of the necessary conceptual and procedural schemas required for advanced ICT competency. Without this targeted support, the high cognitive load inherent in experiential, problem-based ICT tasks would likely lead to frustration, shallow learning, and high abandonment rates, negating the intended benefits of the hands-on approach.

The learning environment itself is conceptually framed by Kolb's Experiential Learning Theory (ELT), which describes learning as a continuous four-stage cycle: Concrete Experience (CE), Reflective Observation (RO), Abstract Conceptualization (AC), and Active Experimentation (AE) (Kolb, 1984). In the context of Grade 9 ICT, the learning process begins with the Concrete Experience of engaging directly in a practical task, such as building a simple website or solving a simulated cybersecurity problem. This hands-on activity immediately generates data and observations which feed the Reflective Observation stage, where students ponder what worked, what failed, and why. This reflection, often guided by critical self-assessment or peer feedback, then transitions into Abstract Conceptualization, where learners derive general principles, theories, or models from their observations (e.g., identifying a design pattern or a coding rule). Finally, these new concepts are tested through Active Experimentation in a new or modified ICT task, restarting the cycle. The value of ELT in ICT education lies in its ability to bridge the gap between theoretical knowledge (the 'why' and 'what') and procedural skill (the 'how'). Unlike passive learning environments, the EL cycle ensures that knowledge is not just memorized but deeply integrated through application and critical evaluation, which is particularly vital for the constantly changing skills required in the technology sector. By centering the pedagogy on active doing, this approach is intrinsically motivating, providing students with immediate, tangible results of their efforts, thereby fostering a sense of self-efficacy and ownership over their learning process. This structural shift moves the classroom from a knowledge consumption space to a knowledge construction workshop, where errors are viewed not as failures, but as essential data points in the learning cycle, demanding immediate analytical engagement from the learner.

The Conceptual Framework for this study lies in the synergistic relationship between ELT and Scaffolding in fostering the three key dependent variables: Learning Achievement, Engagement, and Retention. The Scaffolding Technique is conceptualized as the essential support mechanism integrated within the Kolbian cycle, ensuring its effective execution. For instance, during the Concrete Experience phase (practical task), scaffolding can take the form of pre-task organizational tools to manage complexity; during the Reflective Observation phase, scaffolding might involve structured prompts or journal guides to ensure the quality of metacognitive thinking; and during the Abstract Conceptualization stage, it can involve graphic organizers to help synthesize findings. This integrated approach ensures that the challenges presented by the Experiential Learning environment remain within the learner's ZPD, maximizing the potential for success and fostering deep cognitive engagement. This synergy directly impacts Learning Achievement, which is measured by pre-test and post-test scores, as scaffolding guarantees that the maximum number of students successfully complete the complex tasks required to master the ICT competencies. Moreover, this supportive framework is hypothesized to dramatically increase Learning Engagement—comprising behavioral (participation in hands-on activities), cognitive (effort invested in understanding), and emotional (interest and intrinsic motivation) components (Fredricks, Blumenfeld, & Paris, 2004)—by minimizing performance anxiety and maximizing the feeling of competence and autonomy. When learners know support is available, they are more willing to risk participation and invest cognitive effort, which are hallmarks of high engagement.

Finally, the study investigates the long-term impact on Retention of ICT-related Knowledge among Grade 9 learners, a critical measure for ensuring the sustainability of educational investments. Retention refers to the ability to recall and appropriately apply both conceptual facts and procedural skills after a significant delay (Anderson, 1982). In ICT, where skills like coding syntax or system administration procedures are highly prone to decay if not reinforced, the mechanism of EL is particularly powerful. By linking abstract ICT concepts to physical, memorable, and successful hands-on experiences, the supported EL cycle creates multiple memory pathways. The combination of active engagement (EL) and successful task completion (Scaffolding) ensures that the knowledge is encoded more robustly into long-term memory. Since procedural knowledge is best retained through repeated, successful practice, the scaffolding technique ensures that initial practices are indeed successful, leading to the efficient development of automaticity. Thus, the conceptual framework posits that the high levels of achievement and engagement facilitated by the scaffolded experiential learning environment will collectively lead to superior long-term retention of the critical ICT knowledge and skills necessary for the students of Valencia National High School to progress to higher levels of technical study and eventual real-world application. This study is thus positioned to offer an empirically validated model for high school ICT instruction, prioritizing not just short-term performance gains, but the sustained, real-world utility of acquired technological skills.

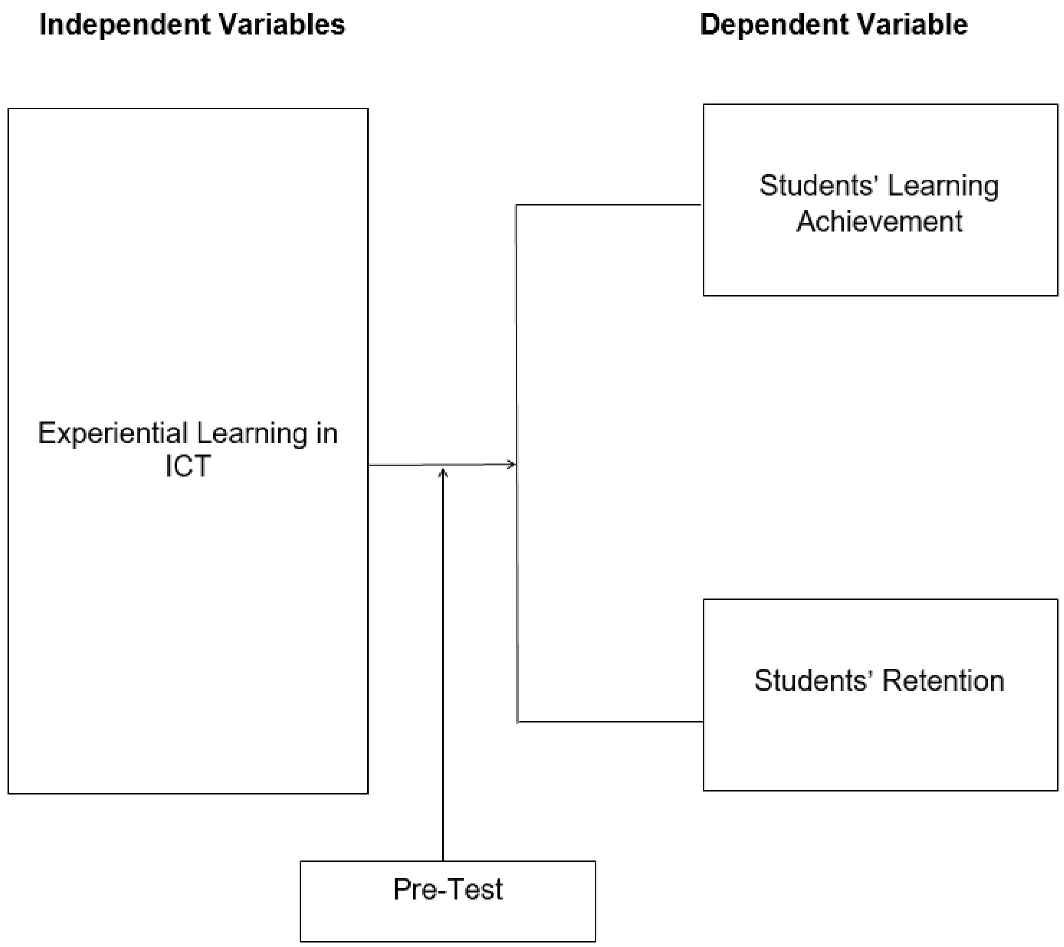

Figure 1. The schematic diagram of the study showing the independent variables and dependent variables.

Statement of the Problem

The proposed study generally aims to examine the students' learning achievement, engagement, and retention with scaffolding technique under experiential learning in ICT of Valencia National High School in District IB, Division of Valencia City.

Specifically, the study seeks to answer the following questions:

1.What is the level of students' learning achievement as exposed to experiential learning in ICT and those exposed to non- experiential learning in ICT in terms of:

a.pre-test?, and

b.post-test?

2.What is the level of student's retention as exposed to experiential learning in ICT and those exposed to non- experiential learning in ICT?

3.Is there a significant difference on the students' learning achievement as exposed to experiential learning in ICT and those exposed to non- experiential learning in ICT of pre-test and posttest?

Significance of the Study

This study was conducted because the researcher believes that the findings, grounded in empirical data on experiential learning in ICT, would benefit and provide significant contributions to the following key stakeholders:

To the Learners. This study may aid learners by demonstrating the direct positive effects of hands-on ICT experiences on their learning process. This research may help them understand that active participation and practical application are essential mechanisms for improving their critical thinking skills, sustaining their learning engagement, and ensuring long-term retention of ICT knowledge, thereby enhancing their overall academic and technical competence.

To the Teachers. Teachers, particularly those in the ICT and Computer Education fields, may benefit from this study by gaining evidence-based justification for shifting their pedagogical methods. The findings can help teachers move beyond traditional lecture formats and adopt practical, project-based teaching strategies, leading to more positive and productive interactions with students and ultimately helping to create a learning environment that effectively develops the critical thinking and applied skills necessary for future careers.

To the Curriculum Developers and Administrators. School administrators and curriculum developers are increasingly depended on to build relevant educational programs. This study may assist them in working together to counteract the limitations of theory-heavy curricula by providing data to support necessary curriculum restructuring. The research offers strategies, such as providing guidelines for incorporating hands-on activities and allocating resources for necessary ICT laboratory setups, thereby ensuring nurturance and continuity in high-quality technical education.

Future Researchers. Future researchers may use this study as the foundation for a more comprehensive source of linked literature on the relationship between experiential learning in technology and multiple student learning outcomes. It provides a validated methodology and benchmark data on learning engagement, critical thinking, and retention in the context of ICT concepts, which can be replicated or extended to other technical subject areas.

Review of the Literature

Hands-on ICT Pedagogy

The nature of Information and Communication Technology demands an application-based pedagogy. ICT skills are inherently procedural; they require practical execution. Ramírez (2020), in a critical look at the K to 12 Curriculum implementation in the Philippines, emphasizes that curriculum success hinges on overcoming resource limitations to enable genuine applied learning. This necessity is further compounded by the rapidly changing technological landscape. Teaching an ICT concept theoretically today, without application, means teaching an obsolete skill tomorrow.

Recent developments in ICT pedagogy highlight the importance of integrating technology with effective teaching strategies. Chai et al. (2020) found that teachers who effectively integrate ICT tools into their pedagogy enhance students' critical thinking and problem-solving skills. Additionally, Martín-García and Sánchez-Gómez (2020) emphasized that digital learning environments should promote collaboration, interaction, and active learning, all of which are essential in ICT education.

Experiential Learning in ICT

Experiential learning has been further strengthened in recent studies, particularly in technology-enhanced environments. Hsu and Ching (2019) found that mobile-based experiential learning significantly improves students' ability to apply knowledge in real-world contexts. Similarly, Tang et al. (2020) demonstrated that experiential and gamified learning environments increase both motivation and skill acquisition in ICT-related subjects. These findings support the integration of experiential learning strategies in ICT classrooms to enhance both performance and engagement.

Learning Engagement in ICT

Student engagement in digital learning environments has become a central focus of recent educational research. Bond et al. (2020) identified that interactive and technology-supported learning environments substantially rise student engagement. Similarly, Kahu and Nelson (2018) emphasized that engagement is influenced by both institutional and personal factors, including teaching strategies and learning design. In ICT classrooms, the use of hands-on activities and digital tools fosters active participation and sustained interest among learners.

Hands-on Experience and Knowledge Retention

Cognitive science provides a clear mechanism for the link between hands-on experience and retention: the Encoding Specificity Principle and the Testing Effect (Roediger & Karpicke, 2019). The Encoding Specificity Principle states that memory is strongest when the context of retrieval (the situation where you need to use the knowledge) correlates the context of encoding (the situation where you learned it). When students learn an ICT skill by actively doing the configuration in a lab environment, the memory is encoded with motor, visual, and contextual cues.

The Research Gap

In the context of 21st-century education, digital literacy and ICT competence are essential skills for students. The OECD (2021) emphasizes that learners must not only acquire knowledge but also develop the ability to navigate digital environments effectively. As such, integrating experiential learning and scaffolding strategies in ICT education is crucial in preparing students for the demands of the digital age.

Implications for DepEd Policy and Practice

Ramírez (2020) contends that systemic challenges within the K to 12 implementation, particularly concerning resource constraints for technical subjects, demand empirical justification for pedagogical investment. The positive findings of this study, by quantifying the benefits of hands-on ICT, will provide local evidence necessary for school heads and division superintendents to advocate for the equitable distribution of computer laboratory time and materials, thereby aligning practice with the functional literacy goals emphasized in DepEd Order No. 21, s. 2019.

Research Methodology

Research Design

The study employed a Quasi-Experimental Research Design, specifically the Pre-test/Post-test Non-equivalent Control Group Design. This design was appropriate because it utilized pre-existing, naturally formed classroom groups, often referred to as intact classes, which was necessary given the infeasibility of purely randomized assignment in actual school settings. For the purpose of this study, two intact Grade 9 ICT classes were identified: the Experimental Group, which received the Hands-on ICT Pedagogy (the intervention), and the Control Group, which received the Traditional Lecture-Demonstration Method (the standard instruction).

The flow of the research involved a systematic sequence of assessments and intervention. Initially, a Pre-test (T1) was administered to both groups to measure baseline knowledge and pre-instructional disposition (Achievement and Engagement). Following this, the intervention period commenced, where the Experimental Group received the hands-on pedagogy (X) and the Control Group received the traditional method (C). The effectiveness of the intervention was measured using two subsequent post-tests: Post-test 1 (T2), which measured the immediate post-instruction outcomes (Achievement and Engagement), and Post-test 2 – Retention Test (T3), which was administered three weeks after T2 to specifically measure Knowledge Retention. The final outcomes of the two groups were then statistically compared using their post-test scores, adjusted by their pre-test scores, to determine the causal effect of the hands-on instruction.

Research Locale

The study was conducted at Valencia National High School (VNHS), located within the Division of Valencia City. VNHS was selected as the research locale due to its diverse student population and its status as a large public school implementing the K to 12 curriculum, making the findings highly relevant and applicable to similar DepEd schools in the region. The study utilized the school’s existing computer laboratory facilities.

Valencia National High School was one of the largest comprehensive high schools in the Division of Bukidnon, typically serving over 5,000 students annually. This size ensured a sufficient and diverse pool of participants, reflecting the general student characteristics of a major public school implementing the Enhanced K to 12 Basic Education Program. Furthermore, VNHS maintained a well-established and active Technology and Livelihood

Education (TLE) track, complete with dedicated computer laboratory facilities and specialized ICT teachers, which was critical for the proper implementation of both the experimental hands-on pedagogy and the control group's traditional instruction.

The participants consisted of two intact, homogeneous classes of Grade 9 students enrolled in the Technology and Livelihood Education (TLE) program with a specialization in Information and Communication Technology (ICT) during the current school year.

Purposive Sampling was employed in selecting the two classes, ensuring they were streamed (homogeneous) and had comparable entry-level data (e.g., general academic performance or average ICT grades from the previous term). The two classes were randomly assigned to the Experimental Group and the Control Group through a drawing of lots after the initial data.

Findings

Both groups demonstrated uniformly very low learning achievement prior to the implementation of the teaching interventions. All students in both the Experiential and Non-Experiential groups fell into the Very Low category, scoring below seventy-five percent on the fifty-item ICT assessment. The mean scores for both groups were very low and nearly identical, indicating that students across both conditions possessed minimal prior knowledge of the ICT concepts assessed and started from a comparable baseline. This equivalence established a solid foundation for measuring the differential effects of the two teaching approaches.

The posttest results revealed a marked divergence in learning achievement between the two groups. The Experiential group achieved a mean score interpreted as Moderate, while the Non-Experiential group obtained a mean score interpreted as Very Low. In the Experiential group, more than half of the students achieved scores of eighty-five and above, with a significant percentage reaching the Very High bracket. A considerable portion also attained Moderate and Low achievement, while only about one-third remained in the Very Low category. This represented a substantial improvement from their pretest baseline, with the majority of students moving out of the Very Low classification after experiencing the experiential teaching intervention.

In contrast, the Non-Experiential group showed minimal improvement, with all students remaining in the Very Low category after instruction. Their mean score, while improved from the pretest, still fell far below the minimum passing score of seventy-five percent. None of the students in this group reached even the Low achievement bracket, indicating that the non-experiential teaching method was largely ineffective in helping students master the ICT concepts assessed.

The retention test results demonstrated the lasting impact of the two teaching approaches on students' long-term knowledge acquisition. The Experiential group maintained a mean score interpreted as Moderate, which remained virtually unchanged from their posttest mean. This indicated that students who learned through experiential methods successfully preserved their learning gains over time. An impressive majority of students in the Experiential group remained in the Very High, High, and Moderate brackets, demonstrating durable learning. Only a small portion fell back into the Very Low category, suggesting that some students actually improved their retention over time.

The Non-Experiential group obtained a mean score interpreted as Very Low, with the vast majority of students remaining in the Very Low category on the retention test. Only one student reached the Low bracket. While their mean score showed slight improvement from the posttest, this increase still left the majority of students far below minimum competency, suggesting that any delayed gains were insufficient to achieve meaningful learning outcomes.

The statistical analysis revealed a significant difference in learning achievement between the Experiential and Non-Experiential groups. The Experiential group had a substantially higher mean achievement score compared to the Non-Experiential group. The analysis yielded a large F-value and a p-value below the established significance level, indicating that the difference between groups was statistically significant and highly unlikely due to chance. The pretest scores showed no significant difference, confirming that both groups had comparable achievement levels before the intervention and that the post-intervention differences could be attributed to the instructional methods themselves.

CONCLUSIONS AND RECOMMENDATIONS

Based on the results and discussions presented, the following conclusions are drawn:

Both groups demonstrated comparable and very low prior knowledge of ICT concepts before the intervention, as evidenced by their pretest scores. This equivalence establishes that any post-intervention differences in learning outcomes can be attributed to the instructional methods themselves rather than to pre-existing disparities between groups. The very low baseline achievement also confirms that students had not yet developed meaningful understanding of the ICT concepts to be taught, making them appropriate participants for an experimental comparison of teaching methodologies. The uniformity of pretest results across both groups strengthens The experimental design's internal validity.

Experiential learning proved to be substantially more effective than non-experiential instruction in improving students' learning achievement in ICT. The majority of students exposed to experiential methods achieved at least minimum competency, with more than a quarter reaching the highest level of achievement. This indicates that engaging students in concrete experiences, thoughtful observation, abstract thought, and active experimentation facilitates deeper cognitive processing and more meaningful understanding. The study concludes that experiential learning, which positions students as active participants in the learning process rather than passive recipients of information, creates more robust mental representations that enhance both comprehension and application of ICT concepts.

Non-experiential teaching methods proved largely ineffective in helping students achieve meaningful learning outcomes in ICT. All students exposed to non-experimental instruction remained below the minimum competency level, with none reaching even the Low achievement bracket. This suggests that passive reception of information through lectures and readings, without opportunities for active engagement and reflection, is insufficient for developing deep understanding in ICT education. The study concludes that traditional instructional approaches that prioritize content delivery over student engagement fail to provide the experiential foundation necessary for meaningful knowledge construction.

Experiential learning develops not only stronger initial understanding but also more enduring knowledge retention compared to traditional instructional approaches. The sustained performance of the Experiential group, with the majority of students maintaining scores above the minimum competency level, demonstrates that knowledge constructed through active engagement and reflection is more deeply encoded and resistant to decay. The study concludes that learning through the complete experiential cycle creates lasting cognitive structures that support long-term retention and application of knowledge. The virtually unchanged mean scores from posttest to retention test indicate that experiential learning produces durable learning outcomes that persist over time.

The statistical analysis confirms that experiential learning is significantly more effective than non-experimental instruction in promoting learning achievement in ICT. The large and statistically significant difference between groups, combined with the equivalence of pretest scores, provides strong evidence that the instructional method itself caused the observed differences in outcomes. The study concludes that the structured, reflective, and application-oriented nature of experiential learning provides a framework that supports learners in building integrated understanding rather than memorizing isolated facts. Consequently, the null hypothesis is rejected, confirming the superior effectiveness of experiential learning for ICT education.

Based on the conclusions drawn from the study, the following recommendations are provided:

ICT educators may prioritize the integration of experiential learning approaches in their instructional design to enhance student learning achievement and long-term retention. Teachers are encouraged to move beyond lecture-based instruction and create opportunities for students to engage directly with ICT tools, reflect on their problem-solving processes, formulate conceptual understandings, and apply their learning in new contexts. Curriculum developers may design learning materials and assessment tasks that support the complete experiential learning cycle, ensuring that students have structured opportunities for concrete experience, reflective observation, abstract conceptualization, and active experimentation.

School administrators may implement professional development programs that equip teachers with the knowledge and skills necessary to design and facilitate experiential learning experiences. Training workshops, learning communities, and mentoring programs may focus on helping teachers understand Kolb's experiential learning theory and translate it into effective classroom practice. Administrators may also allocate resources for experiential learning materials, tools, and technologies that enable students to engage in authentic, hands-on learning experiences in ICT.

Teacher education institutions may incorporate experiential learning theory and practice into their pre-service teacher preparation programs. Future teachers should understand the theoretical foundations of experiential learning and develop competencies in designing and facilitating experiential learning experiences across subject areas. Teacher educators may model experiential approaches in their own teaching, providing pre-service teachers with direct experience of learning through the complete experiential cycle.

Students are encouraged to actively engage in experiential learning opportunities and take ownership of their learning process. Rather than passively receiving information, students may seek out hands-on experiences, reflect deeply on their learning, connect experiences to conceptual understanding, and actively experiment with applying their knowledge in new situations. Students may also provide feedback to teachers about their learning experiences, helping to refine and improve experiential approaches over time.

Future researchers are encouraged to explore specific dimensions of experiential learning in greater depth to uncover more nuanced insights into its influence on learning achievement.

Comparative studies across different subject areas, grade levels, and educational contexts can provide significant insights into the generalizability of experiential learning effects. Researchers may also investigate the differential effects of each stage of Kolb's cycle to determine which components contribute most substantially to learning gains and retention. Longitudinal studies tracking students over extended periods may provide evidence of the long-term benefits of experiential learning for career readiness and lifelong learning.

Additionally, future research may explore the integration of technology with experiential learning approaches, examining how virtual reality, simulations, and artificial intelligence can enhance or extend hands-on learning opportunities. Qualitative studies investigating students' experiences and perceptions of experiential learning may provide rich insights into the mechanisms through which experiential approaches produce their effects. Mixed-methods designs combining quantitative achievement data with qualitative accounts of student learning experiences may yield a more comprehensive understanding of how and why experiential learning works.

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