EXPLORING CONSTRAINTS TO THE ADOPTION OF EVIDENCE-BASED PRACTICES IN TECHNOLOGY EDUCATION: PERSPECTIVES FROM EDUCATORS AND POLICY MAKERS.

Ifeoma Blessing Okafor, Glory Ure Nwankwo, Jude Obinwanne Ezeani, Blessing Nonye Emmadiole, Maureen Chizoba Nwenyi

School of Science, Federal College of Education (Technical), Umunze Nigeria.

blessing.okafor@fcetumunze.edu.ng

Abstract

The global push toward evidence-based practice in education has intensified expectations that teaching, curriculum development, and policy decisions particularly in technology education be grounded in rigorous empirical research. Yet the implementation of evidence-based research (EBR) in technology education remains uneven and contested. This paper critically examines the persistent barriers to embedding EBR in technology education from the perspectives of educators and policy makers. This paper identifies five interrelated constraints: structural and resource limitations, limited research literacy and professional capacity, cultural resistance and epistemological tensions, misalignment between research production and policy cycles, and weak knowledge-mobilization systems. It argues that the challenge is not merely access to evidence but the ecology within which evidence is interpreted, negotiated, and enacted. These opinions reveal not only logistical hurdles but also deeper attitudinal and structural factors that sustain the research-practice gap. Addressing these barriers requires collaborative, context-sensitive approaches that prioritize practitioner input and institutional support to foster meaningful integration of evidence in technology education. It concludes by proposing systemic, collaborative, and capacity-building strategies to enhance research uptake and strengthen the research policy practice nexus in technology education.

Keywords: evidence-based practice, technology education, research utilization, policy implementation, knowledge mobilization.

Introduction

The persistent divide between educational research and classroom practice remains a critical challenge in technology education, where evidence-based practices (EBPs) such as inquiry-driven computational thinking, project-based digital tool integration, and research-supported pedagogies for fostering digital literacy often struggle to gain traction. Technology education, which includes disciplines such as information and communication technology (ICT), computer science, and design technology within broader STEM frameworks, has undergone significant transformation due to rapid advancements in digital tools, artificial intelligence, and immersive technologies. Empirical research has identified numerous evidence-based practices (EBPs) that enhance student outcomes, including collaborative problem-solving with coding platforms, adaptive learning through simulations and data-driven instructional strategies (McCarty, 2024). However, Bar-Nizan, Katz, & Weiss, (2025) opined that the translation of these research findings into everyday classroom practice remains elusive, perpetuating a well-documented research-to-practice gap.

This gap is particularly pronounced in technology education, where the fast-paced evolution of tools demands agile implementation, yet systemic and individual barriers often impede progress. According to Alqaissi, Al-Qaissi, & Al-Qaisi, (2025)., educators and policymakers as key stakeholders, offer invaluable insights into these challenges. Educators, immersed in daily teaching realities, frequently highlight practical obstacles, while policymakers, focused on broader systemic reforms, emphasize structural constraints. Technology education occupies a unique position in contemporary schooling. It prepares learners not only to understand technological systems but also to participate in innovation, digital transformation, and socio-technical problem solving. Given the pace of technological change and the increasing investment in digital learning infrastructure, calls for evidence-based research (EBR) in this field have grown stronger. Educational reforms now routinely emphasize that instructional strategies, technology integration, and curriculum reforms must be guided by empirical evidence rather than tradition or intuition.

However, despite strong rhetorical commitment to evidence-informed decision-making, implementation remains inconsistent. Surveys indicate that while educators and policy makers value research, its systematic use in practice is often limited (OECD, 2022). In technology education where pedagogical innovation, infrastructure demands, and policy pressures converge, the barriers to evidence use become particularly visible. This paper offers a critical opinion analysis of the

barriers to implementing evidence-based research in technology education, foregrounding the lived realities of educators and the strategic constraints faced by policy makers.

Evidence-Based Research in Technology Education

The concept of EBPs in Education as revealed by Huertas-Zurriaga, Palma-García, & Jiménez-Jiménez (2026) originated from evidence-based medicine but has been adapted to emphasize practices supported by rigorous research, including randomized controlled trials, quasi-experimental designs, and meta-analyses. Also, García-López, López-Núñez, & Marín-Marín, (2025) stated that in technology education, EBPs might involve using gamified platforms to teach computational thinking or leveraging virtual reality for design prototyping, both shown to improve engagement and retention.. Evidence-based research in education refers to the systematic generation, appraisal, and application of high-quality empirical findings to guide teaching and policy decisions. In technology education, this includes research on digital pedagogy, simulation-based learning, AI-supported instruction, design-thinking frameworks, and socio-technical integration. Yet "evidence" itself is not a neutral construct. Debates persist about what constitutes credible evidence randomized controlled trials, design-based research, qualitative case studies, or practitioner inquiry. UNESCO (2024) highlights that stakeholders frequently disagree on acceptable forms of evidence, complicating policy translation. For technology education, where contextual adaptability is crucial, rigid hierarchies of evidence may inadvertently marginalize context-sensitive insights.

EBPs in technology education are grounded in research that demonstrates measurable improvements in student learning outcomes. Examples include inquiry-based learning with robotics, which fosters problem-solving skills (McCarty, 2024), and AI-integrated tools for personalized instruction (Alqaissi et al., 2025). However, effective implementation requires not only access to technology but also pedagogical shifts, professional development, and supportive policies. On this García-López et al.(2025). revealed that the failure to address these elements often results in superficial adoption, where tools are used without aligning to evidence-supported methods.

Recent systematic reviews underscore the persistence of implementation barriers across educational contexts. For instance, Hasim & Baker; Sarmiento, DelaCruz Abrennica (2025) in a review of technology adoption in education identifies inadequate infrastructure and limited training as primary hurdles. Similarly, Murillo-Jiménez, Sánchez-Sixto, & Florido, (2025) in their studies on inclusive

education technologies reveal deficits in teacher digital competence and policy enforcement. In health-related fields, which often overlap with technology education through e-learning tools, barriers include technical issues and lack of tailored resources (Huertas-Zurriaga et al., 2026; Alqaissi et al., 2025). These findings provide a foundation for examining stakeholder opinions specific to technology education.

One of the most frequently cited barriers to evidence implementation is structural constraint. Educators consistently report limited time to engage with research literature, analyse findings, or redesign lessons accordingly. According to the OECD (2022), heavy teaching loads and administrative demands significantly reduce educators' opportunities for research engagement. On this, Murillo-Jiménez et al., 2025; Hasim & Baker 2025). revealed that teachers report heavy workloads, including administrative tasks and standardized testing preparations, leave insufficient time for the planning and iteration required by EBPs. For instance, implementing project-based learning with digital tools demands ongoing assessment and adaptation, this competes with curriculum pacing demands.

Beyond time constraints, access to research remains uneven. Subscription barriers to academic journals, limited digital infrastructure, and inadequate funding for professional learning constrain the uptake of research findings particularly in low-resource contexts. According to Bar-Nizan et al., 2(025) many teachers describe academic publications as jargon-heavy and inaccessible, often requiring subscriptions or advanced literacy . Access to and usability of research itself poses another hurdle. Teachers often view academic literature as inaccessible locked behind paywalls, lacking clear, adaptable guidelines for diverse classrooms. Opinions frequently characterize research as disconnected from local contexts, such as varying student digital access or rapid technological change outpacing studies. This disconnect fosters a view that research is "ivory tower" and irrelevant to local contexts, such as varying student digital divides or cultural factors.

In many settings, technology education teachers are expected to implement digital innovations without sufficient institutional support or sustained professional development. From a policy perspective, funding cycles often prioritize visible technological investments hardware procurement, platform subscriptions over investments in research translation and evaluation. This imbalance reinforces implementation gaps. On this Umoru (2012; Okoduwa, Abe, Samuel, Chris, Oladimeji, Idowu & Okoduwa (2018) ; Omobhude & Chen 2019; Okoye 2O23) documents barriers such as under funding, poverty, corruption and lack of teacher

skills, teacher shortages, poor university-industry collaboration insufficient professional development , cultural biases against girls in STEM and administrative obstacles. These policy-level insights from teachers underscore bureaucratic challenges in translating national guidelines into practice..

This concerns research literacy. Evidence-based practice assumes that educators and policy actors possess the skills necessary to interpret, critique, and apply research findings. However, many teachers receive limited formal training in research methodologies beyond initial teacher education. Professional development is often deemed insufficient. Professional development emerges as a double-edged theme. While many educators value training, they criticize one-off workshops as insufficient for building confidence in complex EBPs. Sustained, job-embedded support is seen as rare, leaving teachers to navigate implementation through trial and error. Alqaissi et al., (2025) noted one-off workshops fail to build sustained competence in EBPs, leaving educators to experiment without guidance. Attitudinal resistance also plays a role; skepticism arises from prior failed initiatives, and some prefer traditional methods due to perceived reliability (McCarty, 2024).

Resource and infrastructure limitations compound this issue. Many educators report inadequate hardware, unreliable internet, outdated software, or insufficient technical support, especially in under-resourced schools. These practical deficits make it difficult to pilot or sustain research-recommended practices, leading to perceptions that EBPs are idealistic for well-equipped environments but unrealistic elsewhere. Researchers as Muraina, Agoi, Onen, Ayinde & Oladapo (2025) emphasize infrastructural and socio-economic hurdles. They identify erratic electricity, poor internet penetration, high data costs, and digital illiteracy as key barriers among undergraduate students negatively impacting adoption rates. Oshowole (2024) reveals inadequate infrastructure, limited technology access, insufficient teacher training, unreliable electricity and funding shortages.

Recent reviews identify insufficient practitioner expertise in research design and data analysis as a core obstacle to evidence-based implementation. (Farias, Costa, & Fereira, Without confidence in evaluating research quality or contextual relevance, educators may rely instead on anecdotal experience or commercially promoted innovations. In technology education, this challenge is amplified by the technical complexity of digital tools and data analysis. Resource limitations further exacerbate these issues. Inadequate hardware, unreliable internet connectivity, and lack of technical support are common complaints, particularly in under-resourced schools (Huertas-Zurriaga et al., 2026). Educators perceive these as rendering EBPs

impractical, especially when research assumes optimal conditions not reflective of diverse classroom realities.

Prakash (2024) notes that beyond infrastructure limitations, second-order barriers beliefs, confidence, and pedagogical competence strongly influence teachers' adoption of research-informed technological innovations. Professional development models that neglect sustained mentorship and inquiry communities often fail to build durable research engagement. Evidence implementation is not solely a technical matter; it is deeply cultural. Teachers' professional identities, institutional traditions, and local norms shape how research is received. Resistance may arise when research findings appear disconnected from classroom realities or when they challenge established pedagogical philosophies. Moreover, epistemological tensions exist between academic researchers and practitioners. Policy makers may privilege large-scale quantitative evidence, while educators may value contextualized, practice-based insights. UNESCO (2024) underscores that disagreement about what counts as credible evidence can slow reform processes.

In technology education, rapid innovation cycles may outpace research production. Teachers often experiment with emerging technologies before rigorous evidence accumulates, creating a tension between innovation and validation. This dynamic complicates efforts to institutionalize evidence-based norms. Research production often operates on extended timelines, while political and administrative cycles demand rapid decisions. The OECD (2022) reports that although policy actors express commitment to research use, structural mechanisms to integrate research systematically into policy processes remain weak in many systems. Furthermore, research findings may not be packaged in accessible, policy-friendly formats. Dense academic publications, technical language, and limited translation efforts hinder usability. Without intermediary structures such as knowledge brokers or research clearinghouses policy uptake becomes selective and inconsistent.

Policymakers' views tend to emphasize macro-level barriers. Funding shortages are a recurring theme, with budgets often prioritizing basic infrastructure over innovative EBP integration (Sarmiento et al., 2025). Policy misalignment, such as curricula focused on rote learning rather than evidence-supported inquiry, hinders adoption (Murillo-Jiménez et al., 2025). Scalability issues are highlighted; even proven EBPs struggle to expand due to bureaucratic hurdles and varying regional priorities (García-López et al., 2025). According to Huertas-Zurriaga et al., (2026). policymakers acknowledge that institutional incentives, like performance metrics tied to test scores, discourage experimentation with novel practices. Ethical and

equity concerns, such as data privacy in AI tools, add layers of complexity (Alqaissi et al., 2025).

While educators focus on immediate, micro-level barriers (e.g., time and resources), policymakers address systemic enablers (e.g., funding and policy coherence) (Bar-Nizan et al., 2025). Convergences include shared concerns over inadequate training and the rapid obsolescence of technology (García-López et al., 2025). These overlapping opinions suggest potential for collaboration, such as joint task forces to align research with practice. Stakeholder opinions illuminate actionable strategies. Co-designing research with educators can enhance relevance (McCarty, 2024), while policymaker-led reforms could allocate dedicated resources for EBP trials (Sarmiento et al., 2025). Huertas-Zurriaga et al., 2026).recommends investments in accessible research summaries and ongoing professional learning communities are recommended. Ultimately, bridging the gap requires honoring these perspectives to build trust and efficacy

Scalability and enforcement challenges dominate policymaker discourse. Even when evidence supports certain practices, rolling them out across diverse districts encounters bureaucratic hurdles, varying local priorities, and resistance to change. Some policymakers acknowledge underestimating classroom-level constraints, recognizing that top-down mandates rarely succeed without addressing frontline realities. Policy opinions also highlight institutional incentives. Evaluation systems that reward traditional metrics over innovative practice discourage risk-taking. Broader priorities—such as equity, inclusion, or economic alignment—sometimes overshadow specific EBPs unless explicitly linked.

Weak Knowledge-Mobilization Systems

Evidence does not travel automatically from research centres to classrooms. Effective knowledge mobilization requires structured networks linking universities, ministries, professional associations, and schools. OECD (2025) findings suggest that while some systems have created mechanisms for research dissemination, coordination remains fragmented. Technology education, often situated at the intersection of multiple ministries (education, innovation, digital economy), suffers from additional bureaucratic complexity. Fragmented governance structures dilute accountability and reduce coherence in evidence implementation strategies.

Toward an Ecology of Evidence Use

The barriers identified above reveal that the problem is not a lack of research but a weak ecosystem for evidence use. Evidence implementation depends on systemic

alignment—resources, professional competence, institutional culture, and policy coherence. From an educator's standpoint, meaningful engagement requires protected time, collaborative inquiry communities, and context-sensitive professional development. From a policy perspective, sustainable reform demands investment in research translation infrastructure and participatory policy design that includes practitioners in evidence interpretation.

An ecological approach recognizes that evidence must be co-constructed, negotiated, and adapted. Technology education, by its interdisciplinary nature, offers fertile ground for collaborative research-practice partnerships that integrate classroom experimentation with systematic evaluation.

Implications

Stakeholder opinions illuminate why the research-practice gap endures in technology education. Overcoming it demands moving beyond isolated efforts toward collaborative models research-practice partnerships where educators shape inquiries and policymakers facilitate supportive structures.

Suggestion for further studies

1. Developing accessible evidence repositories tailored to technology contexts
2. Investing in ongoing professional learning communities
3. Revising policy frameworks to encourage innovative practices.
4. Through policymaker-led reforms, dedicated resources can be allocated for the trial and
5. implementation of evidence-based practices.Advocacy for targeted interventions as enhanced funding and mentorship to bridge the research-practice gap.

Ultimately, honoring these opinions fosters trust and relevance, enabling evidence to inform rather than impose on practice.

Conclusion

The aspiration for evidence-based technology education reflects a broader commitment to educational quality and accountability. Yet the barriers to implementation structural, professional, cultural, and systemic are substantial. Opinions from educators and policymakers reveal a multifaceted array of barriers to

implementing EBPs in technology education, from practical constraints to systemic misalignments. By synthesizing these views with recent evidence, this article advocates for inclusive, collaborative approaches to ensure research informs practice effectively, equipping students for a technology-driven world. Educators require capacity, time, and contextual relevance; policy makers require coordinated systems and accessible evidence. Bridging these divides demands more than rhetorical endorsement of research. It requires systemic investment in the ecology of evidence use. Only then can technology education fully realise the promise of evidence-informed innovation.

Recommendations

To address these barriers, the following strategies are proposed:

1. Institutionalize research literacy programmes within teacher professional development frameworks.
2. Create funded research–practice partnerships linking universities, schools, and policy agencies.
3. Develop knowledge-broker systems that translate research into practitioner-friendly formats.
4. Align policy cycles with research cycles through staged implementation and iterative evaluation.
5. Encourage participatory evidence frameworks that integrate practitioner (educators/teachers) inquiry with formal research methodologies.

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