# FROM JOURNALS TO CLASSROOMS: RE-IMAGINING KNOWLEDGE TRANSFER MODELS FOR BRIDGING RESEARCH–PRACTICE GAPS IN SCIENCE AND TECHNOLOGY EDUCATION

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## Abstract

Bridging the persistent gap between educational research and classroom practice remains a pressing challenge in science and technology education. Despite the proliferation of research studies that identify effective instructional strategies and pedagogical innovations, teachers often struggle to integrate research insights into daily classroom practices. This paper argues that existing knowledge transfer models are insufficient to address the complex, context-dependent realities of classroom teaching. Drawing on scholarship from educational research utilization, knowledge mobilization theory, and science pedagogy, the paper advocates for a re-imagined model of knowledge transfer that emphasizes collaborative engagement, adaptive implementation, and systemic support. By reframing the movement “from journals to classrooms” as a dynamic, bidirectional process rather than a linear dissemination of findings, this paper highlights strategies for enhancing the practical relevance of research, promoting teacher agency, and fostering sustainable improvements in science and technology education.

**Keywords:** Knowledge transfer, educational research, science education, teacher practice, research–practice gap, knowledge mobilization

# Introduction

The production of knowledge in science and technology education has grown exponentially over the last few decades. Peer-reviewed journals, conference proceedings, and policy reports abound with research findings on effective teaching strategies, technological interventions, and innovative pedagogical approaches. Yet, the translation of this evidence into meaningful classroom practice remains uneven, with a persistent gap between what research identifies as effective and what teachers actually implement. In the views of Abraham, et al (2021), scholars have long noted that teachers frequently rely on experience, intuition, and locally available resources rather than research findings when designing and delivering instruction. This gap is not merely a problem of access; it reflects structural, institutional, and cognitive barriers that prevent research from influencing practice in tangible ways (Harrington, 2017). The metaphor "from journals to classrooms" has become emblematic of the challenge of knowledge transfer in education. Traditional models often assume a linear progression: researchers produce knowledge, disseminate it through publications, and practitioners adopt it in classrooms. However, this view neglects the complexity of teaching environments, the agency of teachers, and the situated nature of pedagogical decision-making. Neal and Neal (2025) stated that in science and technology education, these challenges are particularly pronounced. Laboratory resources, technological infrastructure, curricular demands, and student diversity all shape how research insights can be applied in practice. Moreover, the rapid pace of technological innovation and curriculum changes can render even recent research findings difficult to implement effectively without ongoing support and adaptation.

This paper therefore argues that re-imagining knowledge transfer in science and technology education requires moving beyond linear dissemination to a dynamic, relational, and context-sensitive model. It posits that knowledge transfer should be understood as a process of co-construction between researchers and practitioners, where evidence is interpreted, adapted, and embedded within local teaching contexts. By examining current models, their limitations, and alternative approaches, this opinion paper proposes strategies to enhance the relevance, accessibility, and applicability of research in science and technology classrooms.

**The Limitations of Traditional Knowledge Transfer Models**

Conventional knowledge transfer models in education often adopt a unidirectional approach, emphasizing the production and dissemination of research findings without adequately considering teacher agency or contextual constraints. According to Hirschkorn and Geelan (2018), such models typically rely on the assumption that teachers will read academic journals, interpret findings correctly, and implement recommended strategies with fidelity. Yet, empirical evidence suggests that these assumptions rarely hold. According to Berry, Hite, Sloper and Umans (2023), teachers report challenges in accessing paywalled journals, understanding technical language, or aligning research recommendations with curriculum constraints.Furthermore, Sun and Wang (2022) maintained that linear models underestimate the interpretive work teachers must perform to adapt research findings to their classroom realities. Science and technology classrooms vary widely in terms of resources, class size, student readiness, and institutional support. For instance, an inquiry-based instructional strategy proven effective in a well-resourced urban school may not be feasible in a rural school with limited laboratory equipment. Thus, knowledge transfer cannot be reduced to simple adoption; it must encompass contextual translation, whereby teachers interpret and adapt research insights to fit their teaching environment.

Moreover, traditional models also fail to recognize the temporal and relational dimensions of knowledge transfer. Implementing new instructional strategies requires ongoing support, iterative reflection, and collaborative problem-solving. Li (2022) reported that without structures that facilitate sustained engagement between researchers and practitioners, evidence is unlikely to translate into meaningful practice changes. In short, linear models are insufficient for bridging the persistent research–practice gap in science and technology education.

**Re-imagining Knowledge Transfer: Principles for a Dynamic Model**

In order to address the observed limitations, knowledge transfer needs be conceptualized as a dynamic, relational, and adaptive process. According to Dequanter, Steenhout, Fobelets, Gagnon, Sasseville, Bourbonnais, Giguère, Ndiaye, Lambert, Gorus and Buyl. (2022), three core principles underpin a re-imagined model. These include: collaborative engagement, textual adaptation and sustained support and reflection.

**Collaborative Engagement:** Effective knowledge transfer requires active collaboration between researchers and teachers. Collaborative engagement goes beyond mere consultation; it involves teachers in the co-creation of research projects, data interpretation, and the adaptation of findings for practical classroom use. According to Lilienfeld, Ritschel, Lynn, Cautin and Latzman (2015), through collaborative workshops, joint planning sessions, and co-design activities, teachers gain ownership of the research application process. This principle therefore acknowledges that teachers possess unique contextual knowledge and experiential insights that are critical to translating abstract research into effective pedagogical strategies. By fostering bidirectional dialogue, researchers can bemore able to refine their studies to meet real classroom needs, while teachers develop confidence in implementing strategies grounded in empirical evidence. Such engagement also promotes professional learning, encourages reflective practice, and builds sustained relationships that support iterative improvements in teaching and learning (Chen, Li, Zhao, Ning & Hao, 2023).

**Contextual Adaptation:** this implies interpreting research insights to suit classroom levels. According to Jung, Rasor, Rybnicky, Silverman, Standeven, Kuhn, Granito, Ekas, Wang, Karim, Lucks & Jewett (2023), research insights need to be interpreted and modified to suit specific classroom contexts to enable or assist teachers' assimilation and consequent practical implementation. This principle emphasizes the necessity of tailoring instructional strategies to the realities of individual classrooms, school cultures, and student populations. According to Bucher, Walther, Solli, Tønnessen and Haugen (2023), teachers must consider variables such as student prior knowledge, cultural backgrounds, resource availability, class size, and curriculum demands when adapting research-based practices. Contextual adaptation also involves creative problem-solving; for instance, teachers may simulate laboratory experiments using low-cost materials when access to standard equipment is limited. Additionally, this principle recognizes that what works in one context may not work in another, and encourages ongoing experimentation and refinement. Martínez-Gaitero, Dennerlein, Dobrowolska, Fessl, Moreno-Martínez, Herbstreit, Peffer and Cabrera (2024) were of the views that by embedding flexibility and responsiveness into knowledge transfer, contextual adaptation ensures that research-based strategies remain both effective and feasible across diverse educational environments.

**Sustained Support and Reflection:** Knowledge transfer is an ongoing process that benefits from continuous support, mentoring, and opportunities for reflective practice. Sustained support involves institutional structures such as professional development programs, instructional coaching, and access to collaborative networks that maintain engagement over time. Lou and Jaeggi (2020) maintained that reflection allows teachers to evaluate the effectiveness of implemented strategies, identify challenges, and make evidence-informed adjustments. The scholars further stated that structured reflective cycles, including peer discussions, self-assessment, and feedback sessions, reinforce learning and encourage the iterative refinement of teaching practices. Therefore, by integrating support and reflection, teachers can move from initial adoption of research-based strategies to deep, contextually nuanced application that promotes long-term improvements in student learning outcomes.

**Mechanisms for Effective Knowledge Transfer**

Several mechanisms operationalize these principles in science and technology education. Shikuku, Bar-Zeev, Ladur, Allott, Mwaura, Nandikove, Uyara, Tallam, Ndirangu, Waweru, Nyaga, Bashir, Bedwell and Ameh (2024) listed these mechanisms to include: Teacher-Researcher Partnership, professional Learning Communities (PLC), Knowledge Mobilization Platforms, Reflective Implementation Cycles, and Embedded Mentoring.

**Teacher–Researcher Partnerships:** These partnerships involve close collaboration between teachers and researchers throughout all phases of the research process, from design to dissemination. Necip, Lorenzen, Qvist, Ellegaard and Agustian (2025) maintained that by actively participating in research, teachers gain first-hand understanding of methodological approaches, data interpretation, and the rationale behind recommended practices. according to Megha (2024), partnerships may take the form of joint curriculum projects, classroom-based action research, or teacher-led investigations guided by research mentors. Such collaborations can therefore build mutual trust, enhance the practical relevance of research, and empower teachers to become co-creators of knowledge rather than passive recipients.

**Professional Learning Communities (PLCs):** Professional Learning Communities are structured groups of educators who engage in continuous dialogue, knowledge sharing, and collective problem-solving. Ma, Zuo, Gao, Yan and Luo (2024) stated that in the context of science and technology education, PLCs facilitate the exchange of research-informed strategies, support collaborative lesson planning, and allow teachers to collectively evaluate the impact of new instructional practices. In the views of VanderKaay, Letts, Jung and Moll (2019) Professional Learning Communities foster a culture of shared accountability, reflection, and peer learning, which is particularly effective for translating research into actionable classroom strategies.

**Knowledge Mobilization Platforms:** These are online platforms, open-access journals, practitioner-oriented briefs, and multimedia repositories which can make research findings more accessible and usable for educators. Adiguzel, Potvin, Sarrasin, Vanhoolandt, Corfdir, Japashov, Mansurova, Tsai, Wu, Elmas, Atik-Kara, Kucukkayhan, Zaid, Kouchou, Voulgari, Sy, Sakho, Charland and Létourneau (2025) avowed that these platforms distill complex academic research into concise, practical guidance, including step-by-step instructional strategies, exemplar lesson plans, and context-specific case studies. Effective knowledge mobilization platforms can therefore incorporate interactive features such as discussion forums, feedback mechanisms, and real-time support, bridging the gap between research output and practical classroom application.

**Reflective Implementation Cycles:** These are iterative cycles of planning, enactment, observation, and reflection which can enable teachers to continuously refine their use of research-based strategies. According to Fuchs, Kahn-Horwitz and Katzir (2019), these cycles encourage teachers to experiment with instructional approaches, assess student responses, and adjust methodologies in light of observed outcomes. Akintola, Newbury-Birch and Kilinc (2024) equally reported that reflective implementation cycles embed evidence-based practice into the daily routines of teaching, fostering adaptive expertise and ensuring that research informs classroom decision-making in a dynamic and responsive manner.

**Embedded Mentoring:** Mentoring involves pairing less experienced or research-novice teachers with seasoned educators or instructional coaches who provide guidance on implementing research-informed strategies. In the views of Langberg, Dvorsky, Molitor, Bourchtein, Eddy, Smith, Oddo. and Eadeh (2018), embedded mentoring extends beyond one-off coaching sessions, integrating ongoing support within the school context. The scholars maintained that mentors offer real-time feedback, model effective practices, help troubleshoot challenges, and facilitate reflection. This continuous guidance therefore enhances teachers' confidence and competence, ensuring that research insights are meaningfully translated into sustained classroom improvements.

**Implications for Science and Technology Education**

Adopting a dynamic model of knowledge transfer can have several implications. According to Dignath and Mevarech (2021), some of the implications can include:

1. Teacher Agency: Teachers become active participants in shaping instructional practices, increasing ownership and likelihood of sustained implementation.
2. Research Relevance: Researchers gain a deeper understanding of classroom realities, informing future studies that address practical constraints and priorities.
3. Student Learning: Adapted, context-sensitive strategies are more likely to improve student engagement, conceptual understanding, and higher-order thinking skills.
4. Policy and Institutional Support: Systemic structures such as professional development programs, collaborative networks, and resource allocation are essential to operationalize dynamic knowledge transfer.

## Conclusion

The persistent gap between research and practice in science and technology education demands a re-imagined approach to knowledge transfer. Linear dissemination models are inadequate for addressing the complex realities of classrooms. Instead, knowledge transfer should be understood as a dynamic, relational, and context-sensitive process that emphasizes collaboration, adaptation, and sustained support. By reframing the movement "from journals to classrooms" as an iterative and co-constructed process, educators and researchers can bridge the research–practice gap, enhance teacher agency, and improve student learning outcomes in science and technology education. Future efforts should focus on developing systemic structures that facilitate this dynamic knowledge transfer, including teacher–researcher partnerships, professional learning communities, reflective implementation cycles, and embedded mentoring systems.

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