Integrating Appreciative Education and Funds of Knowledge in Mathematics Classrooms

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Many students see mathematics as disconnected from their lives, which can lead to low confidence and limited engagement. Strength-based approaches such as Appreciative Education (AE) and sociocultural perspectives such as Funds of Knowledge (FoK) offer ways to make mathematics learning more meaningful and relevant. However, these approaches have largely been developed separately, and their relationship in mathematics education has received limited attention. This paper explores how AE and FoK can be understood together and proposes a conceptual framework that connects their key ideas.

Introduction

Many students continue to experience mathematics as disconnected from their lived experiences, which can lead to low confidence and limited engagement, particularly among learners from culturally diverse backgrounds (Moschkovich, 2012). Despite ongoing reform efforts and curriculum developments, mathematics classrooms often remain procedural and textbook-driven, with limited attention to students' cultural knowledge and everyday experiences.

This challenge has become particularly visible in the New Zealand context. International assessments such as the Programme for International Student Assessment (PISA) have revealed a steady decline in mathematics performance, with widening gaps across cultural, linguistic, and socioeconomic groups. The 2022 results showed the lowest mean score since New Zealand began participating in PISA. These patterns have intensified concerns about both achievement and equity in mathematics education.

In Aotearoa New Zealand, educational policy has increasingly emphasised equity, inclusion, and cultural responsiveness, including commitments shaped by Te Tiriti o Waitangi, the 1840 agreement between Māori and the British Crown. In an educational context, the principles of Te Tiriti o Waitangi underpin the partnership between Māori and educational institutions, protection of Māori language, culture, identity, and knowledge, and participation of Māori learners and whānau in education (Orange, 2015). Such commitments call for teaching approaches that acknowledge identity, language, and lived experience as central to learning. Within this context, frameworks such as FoK and AE offer relevant but distinct perspectives. FoK highlights the cultural and intellectual resources embedded in students' home and community practices (Moll et al., 1992), while AE foregrounds relational practice and the affirmation of strengths (Bloom et al., 2013).

Although each framework contributes to ongoing discussions about engagement and equity, research on their integration within mathematics education remains limited. Exploring how relational affirmation and sociocultural recognition might be brought together offers a potential direction for rethinking mathematics teaching in culturally diverse classrooms.

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Literature Review

In New Zealand, mathematics education in primary and secondary school classrooms is shaped by national curriculum frameworks and sociocultural diversity (Ministry of Education, 2007). Although the New Zealand Curriculum promotes learner-centred approaches and contextualised learning, classroom practices often remain procedural and textbook-driven (Anthony & Walshaw, 2007). Research indicates that when students' home practices, cultural narratives, and epistemologies are not recognised in the classroom, their motivation and participation in mathematics decline (Hunter & Anthony, 2011). The recent curriculum refreshes prioritised cultural responsiveness, identity development, and inclusiveness, while also emphasising learner progress and the development of mathematical knowledge, skills, and competencies (Ministry of Education, 2023). These priorities align with psychological principles related to autonomy, competence, and relatedness (Deci & Ryan, 1985). In classroom learning, supporting these needs is associated with stronger engagement and well-being (Niemiec & Ryan, 2009). This is relevant to mathematics learning because students with low mathematics self-efficacy may have less confidence in their capacity to solve mathematical problems, while mathematics anxiety is negatively associated with mathematics achievement (Barroso et al., 2021; Pajares & Miller, 1994). Primary and secondary students seek recognition and affirmation in learning contexts (Yu & Zhang, 2021), and appropriate use of appreciation can enhance engagement and confidence (Yang, 2024). These developmental and contextual considerations highlight the importance of relational, culturally responsive approaches in mathematics education.

Appreciative Education

Appreciative Inquiry (AI) was first proposed as a strengths-based approach to organisational and social change (Cooperrider & Srivastva, 1987). AI emphasises identifying and leveraging the existing strengths, successes, and potential within a system and follows a cyclical process known as the 4-D model: Discovery, Dream, Design, and Destiny (Cooperrider & Srivastva, 1987).

Building on these foundational principles, AE has emerged as an educational adaptation of AI, developed to affirm students' strengths, cultivate trust-based teacher–student relationships, and support holistic learner development (Bloom et al., 2013). AE is a framework for delivering high-quality education at both the individual and organisational levels, adapting the principles of appreciative inquiry to educational settings (Bloom et al., 2013). It is rooted in social constructivism, positive psychology, and appreciative inquiry. AE is fundamentally underpinned by social constructivism, which views learning as an active and collaborative process. AE emphasises open-ended questioning, mutual learning, and the recognition of individual strengths, creating a classroom environment where students' existing knowledge is valued and expanded. A second key foundation of AE lies in positive psychology, which emphasises the cultivation of individual strengths, positive emotions, and psychological well-being (Seligman & Csikszentmihalyi, 2000; Seligman, 2011). Rather than focusing on grades or correcting behaviour, AE supports the whole student by fostering a supportive and encouraging environment (Bloom et al., 2013). In mathematics classrooms, such an approach could reduce anxiety, increase student engagement, and create a safe space where students feel confident to try, fail, and grow (Yan & Li, 2022; Yang, 2024).

An essential component of AE is the appreciative mindset (Bloom et al., 2013), which underpins its relational and strengths-based philosophy. Rather than concentrating on students' deficits or shortcomings, this mindset encourages educators to intentionally seek out and affirm students' strengths, potential, and past successes. To operationalize this mindset, AE follows a cyclical process known as the 6-D model: Disarm, Discovery, Dream, Design, Deliver, and Don't settle (Bloom et al., 2013). This cycle includes two additional phases at the beginning

and end compared to the appreciative inquiry framework, emphasising the creation of a trusting environment and ongoing development.

Recent studies have demonstrated AE's impact across various educational contexts, including student advising, classroom instruction, and institutional leadership (Bloom et al., 2013; He et al., 2014; Mather & Smith, 2021). Furthermore, AE has been applied in mathematics education. At the primary level, Yang (2024), in the Chinese context, highlighted the use of stories, games, and real-life situations in primary mathematics teaching to promote students' interest, participation, confidence, and problem-solving skills. Although the study did not explicitly use the AE framework, its focus on positive participation, learner confidence, and meaningful everyday contexts is consistent with AE principles. Most AE studies are situated outside New Zealand, and there appears to be very limited research examining this issue within the context of Aotearoa New Zealand. This gap presents a valuable opportunity to explore how AE can be meaningfully adapted to support culturally responsive mathematics teaching in New Zealand primary and secondary classrooms.

Funds of Knowledge

Early research by Moll et al. (1992) demonstrated how integrating students' everyday family activities and cultural practices into teaching enhances curriculum relevance and fosters equity. González et al. (2005) further showed that cultural heritage, multilingual abilities, and community-based knowledge constitute valuable intellectual resources. These theoretical developments were extended through the concept of funds of identity (Esteban-Guitart & Moll, 2014), which emphasises identity construction and cultural negotiation as central to equitable and meaningful learning.

The application of FoK in mathematics education has yielded significant insights. Civil (1994, 2002, 2007), working largely in elementary and community-based contexts, demonstrated how family practices such as cooking and budgeting contain rich mathematical concepts that enhance classroom engagement when incorporated into instruction. Walkington (2017), in a secondary algebra context, quantitatively validated personalised algebra problems based on students' interests, revealing significant learning gains. Williams et al. (2020) and Gilde and Volman (2021) further illustrated across school settings how integrating FoK can foster inclusivity and equity within mathematics classrooms.

In the New Zealand context, FoK-informed studies have contributed to culturally responsive pedagogy (Cowie et al., 2011; Hogg, 2013, 2016), aligned with national frameworks such as Tātaiako (Ministry of Education, 2011) and Tapasā (Ministry of Education, 2018). Research has shown how integrating Māori and Pacific knowledge can enhance engagement and strengthen learner identities. Across these studies, FoK has been developed through diverse methodological approaches and contextual adaptations, reflecting both its flexibility and its complexity.

At the same time, important theoretical and practical tensions remain. Critical scholarship questions how FoK can be selectively recognised and enacted in classroom practice. Selective enactment may privilege experiences perceived as safe or socially acceptable while marginalising those shaped by inequality or structural injustice (Bylica, 2023). This concern is discussed through the concept of dark funds of knowledge (Zipin, 2009, 2025), which draws attention to lived experiences often overlooked in school contexts yet possessing educative use-value. Scholars have also questioned how far FoK can be sustained within the everyday constraints of schooling (McIntyre et al., 2001; Rios-Aguilar et al., 2011). From a New Zealand perspective, Hogg (2011) notes that engaging seriously with students' community knowledge demands ongoing relational labour and pedagogical judgement that can be difficult to sustain.

Despite these challenges, FoK continues to offer a valuable framework for recognising students' lived experiences as intellectual resources for learning (Moll et al., 1992; González et

al., 2005). By positioning students' cultural and community knowledge as assets rather than deficits, FoK provides important possibilities for creating more inclusive and meaningful mathematics classrooms (Civil, 2007).

Research Gap and Conceptual Method

Two key gaps emerge from the literature reviewed. The first gap concerns the limited conceptual and empirical understanding of how pedagogical practices informed by AE and FoK are enacted in secondary mathematics classrooms. While both frameworks have been widely discussed and documented, particularly in primary contexts, less is known about how they operate within the subject-specific demands of secondary mathematics, including curricular sequencing, assessment pressures, and disciplinary norms.

The second gap relates to a potential decline in student engagement and confidence as they move into secondary school. Although AE and FoK both emphasise students' strengths, agency, and lived experiences, they have rarely been examined together in classroom-based research. As a result, it remains unclear how these approaches might be integrated to support coherent and sustainable practice in secondary mathematics classrooms.

Addressing these gaps may offer several potential benefits for mathematics classrooms. Students may benefit from opportunities to reflect on their learning and recognise their own strengths in mathematics. Incorporating students' cultural knowledge and lived experiences into classroom activities may also support a stronger sense of belonging and engagement. For teachers, integrating AE and FoK may provide insights into strengths-based and culturally responsive teaching strategies. An appreciative approach may also support teachers in recognising students' strengths and creating classroom environments that encourage meaningful participation in mathematics learning. These considerations highlight the need for a framework that connects relational affirmation with culturally grounded knowledge in mathematics learning.

A conceptual methodological approach was used to develop a combined AE and FoK framework. First, the authors conducted a focused review of literature relating to AE and FoK to develop a clear understanding of the core principles, applications, and limitations of each framework. The two frameworks were then mapped side-by-side by identifying their central concepts, focal practices, educational applications, and points of difference and complementarity. Particular attention was given to how AE's emphasis on affirming students' strengths could align with FoK's focus on valuing students' cultural, family, and everyday experiences within mathematics education. Through this comparative analysis, areas of conceptual overlap and complementarity were identified and organized into comparative tables to form the basis of a combined AE-FoK conceptual framework.

Proposed AE–FoK Framework

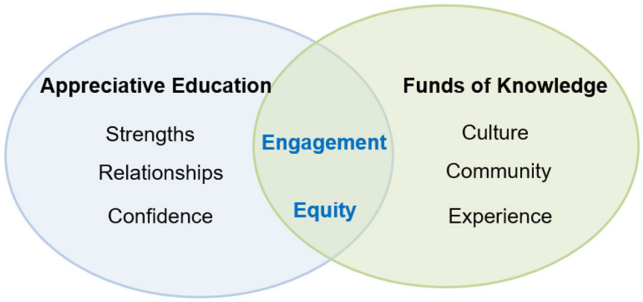
AE and FoK come from different theoretical traditions, yet they share several assumptions that support their integration in mathematics education. Both approaches adopt a strengths-based view of learners and understand learning as socially constructed through interaction and experience. AE draws on social constructivism and positive psychology and emphasises recognising students' strengths through positive dialogue and supportive relationships that nurture motivation and well-being (Bloom et al., 2013). FoK highlights the cultural knowledge and lived experiences students develop within families and communities and treats these experiences as valuable resources for classroom learning (Moll et al., 1992; González et al., 2005). These shared foundations suggest that AE and FoK can work productively together.

Despite these overlaps, the two frameworks emphasise different aspects of teaching and learning. AE emphasises encouragement, trust, and affirmation as central to students' confidence and participation in learning. Previous studies have shown that appreciative

practices can strengthen engagement and foster positive learning environments across educational contexts (He & Hutson, 2018; Mather & Smith, 2021). FoK focuses on the knowledge and experiences students draw from their families, cultures, and communities (Moll et al., 1992). Research in mathematics education shows that connecting instruction to students' everyday mathematical practices can enhance relevance and participation in mathematics learning (Civil, 1994, 2002, 2007; Walkington, 2017). AE is primarily concerned with the relational conditions of learning, while FoK emphasises the knowledge students contribute to the learning process. Together, these perspectives play complementary roles in classroom practice. Figure 1 illustrates the similarities, differences, and complementary relationship between AE and FoK.

Figure 1

Conceptual relationship between AE and FoK



Using AE with the support of FoK, teachers' encouragement has the potential to become more specific and meaningful. Instead of offering general praise, teachers can recognise strengths connected to students' real family and cultural experiences. Appreciation is therefore grounded in identifiable learning resources rather than remaining abstract. The strengths of students become more visible in mathematical activity, enabling teachers to connect encouragement more directly to learning. As a result, AE becomes more meaningful within mathematics classrooms.

When FoK is enacted within an appreciative learning environment, classroom participation potentially could change in noticeable ways. A supportive and affirming atmosphere encourages learners to share experiences that might otherwise remain outside mathematical discussion. As trust develops through ongoing interaction, teachers become more able to recognise forms of knowledge connected to family, cultural, and community practices rather than relying only on surface-level responses. Research in culturally responsive mathematics education shows that participation increases when everyday experiences are treated as legitimate resources for learning (González et al., 2001; Williams et al., 2020). In this context, appreciative practices help create relational conditions that could enable FoK to emerge more fully within mathematics learning.

These processes reveal a reciprocal relationship between the two frameworks. AE supports the discovery of FoK, while FoK grounds appreciative practices in lived experience. Their integration has the potential to support both emotional well-being and engagement in mathematics learning and responds to concerns about declining participation and persistent equity gaps in the New Zealand context.

Although AE and FoK arise from different theoretical traditions, both align with culturally responsive and strength-based approaches to education. AE emphasises relational and emotional support through affirmation and trust-building, whereas FoK highlights learning grounded in cultural and lived experience. Considered together, the two perspectives support a

form of teaching that is both relationally focused and culturally responsive. A comparison between AE and FoK is presented in Table 1.

Table 1

Conceptual comparison of AE and FoK

Dimension	AE	FoK
Core Concept	Uses a strengths perspective to uncover potential in students, teachers, and schools.	Views students' family cultural capital and lived experiences as core teaching resources.
Focus	Students' strengths, potential, and growth narratives.	Students' cultural knowledge, background, family skills, and community experiences
Applications	School-wide culture reform, mental health programs, teacher training.	Multicultural classrooms, family-school partnerships, community-based curriculum.
Limitations	May overlook structural inequalities (e.g., resource disparities).	Requires significant teacher time for family knowledge collection.
Complementarity	AE provides a strengths-based pedagogical orientation.	FoK provides content (cultural resources).

In the Aotearoa New Zealand context, discussions of equity in mathematics education have increasingly drawn attention to both relational teaching practices and the recognition of culturally grounded knowledge. AE and FoK have typically been discussed along these lines separately, with one emphasising relationship and the other emphasising lived experience. Bringing these perspectives together reframes mathematics learning as shaped through their interaction rather than through either dimension alone. The AE–FoK framework proposed in this paper conceptualises engagement in mathematics as emerging through the ongoing interplay between relational affirmation and culturally grounded experience, offering a way to understand participation as relationally and culturally constituted within diverse classrooms. Future research would involve investigating the enactment of AE–FoK integration in secondary mathematics classrooms, particularly how relational affirmation may enable students' FoK to become visible and meaningfully connected to mathematical content.

Conclusion

This paper has proposed an integrated AE–FoK framework that brings together AE and FoK to offer a relational and culturally grounded perspective on mathematics learning. Rather than treating engagement as an individual learner characteristic, the framework conceptualises participation as emerging through the interaction between supportive relationships and lived experience. Appreciative practices help establish trust and recognition, while culturally grounded knowledge provides meaningful connections between students' everyday experiences and mathematical activity. In secondary mathematics classrooms, the framework could guide teachers to start from students' experiences and use appreciative dialogue to connect these experiences with mathematical tasks and discussion.

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