Problem-solving in Education Reform: Evidence and Insights for Low- and Middle-income Countries

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Executive summary

This rapid agenda-setting paper explores the role of problem-solving approaches in facilitating education reform implementation, particularly in low-and-middle income countries (LMICs). It examines evidence from both academic and grey literature and utilizes case studies to provide a nuanced understanding of how problem-solving approaches have been applied in education and their impact on educational outcomes. The paper aims to inform policymakers, educators, and researchers by summarizing existing knowledge and identifying gaps that require further investigation.

Through routine dialogue, coordination, and collaboration, problem-solving approaches in education can improve performance to address systemic change. Evidence suggests that adaptive problem-solving approaches can enhance leadership and build ownership, particularly when it is locally integrated, supported by strong stakeholder engagement, and driven by data. Problem-solving draws heavily from theories such as organizational learning, distributed leadership, and systems thinking that suggest successful problem-solving in education reform is not about implementing static, one-size-fits-all solutions, but rather creating flexible systems that can evolve based on different factors and contexts. The paper begins with an overview of the evidence on successful problem-solving within education systems across LMICs to identify the aspects of problem-solving that may have contributed to the success of the program, such as empowering teachers in their teaching practices. It then explores in more detail through three case studies from Funda Wanda in South Africa, Sobral in Brazil, and Ghana's implementation of delivery units to illustrate how effective problem-solving may look in different contexts, and it explores the different elements of problem-solving such as continuous adaptation, real-time feedback, and the implementation of data-driven decision-making that support the program's success.

This paper also highlights several evidence gaps. The first is the long-term sustainability of problem-solving in LMICs, particularly their cost-effectiveness. The mechanisms that ensure the continuity and resilience of these reforms require deeper examination to develop strategies that extend their impact beyond the initial implementation stage. Additionally, while stakeholder engagement is critical to problem-solving approaches, the dynamics of these relationships remain insufficiently understood. One way to address this would be through the creation of a problem-solving typology that categorizes the many ways problem-solving is used within education reform. Finally, the role of gender and inclusion was notably missing from the literature. Future research should investigate how gender dynamics contribute to or hinder the success of problem-solving approaches. Addressing these gaps through further research is essential for developing more effective problem-solving approaches. Overall, this paper illustrates the potential of problem-solving approaches to address the complex challenges faced by education systems in LMICs, yet continued research is needed to refine these approaches and ensure their effectiveness in diverse contexts.

Introduction

Governments worldwide have set ambitious goals to improve service delivery within the education sector. However, they have historically struggled to turn these intentions into tangible actions due to the complexities and challenges inherent in bureaucratic systems (UNESCO, 2021). Many education systems, especially in low- and middle-income countries (LMICs), face significant obstacles, including limited resources, socioeconomic disparities, and political instability. These factors hinder the implementation of effective reforms (World Bank, 2018). In Sub-Saharan Africa, for instance, more than 50 percent of children are not achieving minimum proficiency levels in reading and mathematics, highlighting the urgent need for effective reforms (UNICEF, 2021).

To address these challenges, delivery approaches were introduced to improve bureaucratic functioning and policy delivery by combining management functions in a novel way to shift the focus from inputs and processes to outputs and outcomes (The Education Commission, 2023). The DeliverEd Initiative (led by the Education Commission in partnership with Blavatnik School of Government) undertook research on five delivery approaches to understand to what extent they led to improved learning outcomes. One of the key findings was that delivery approaches had a strong focus on accountability (with positive and negative consequences) but were less effective at harnessing data and using problem-solving and organizational learning to effect change—despite education systems recognizing the need to move beyond traditional top-down reform models and adopt more adaptive, problem-solving approaches that enhance local ownership and lead to sustainability (Anderson & Bergmann, 2022; Bell et al., 2023; Centre for Public Impact, 2016). Problem-solving approaches are particularly useful at decentralized levels of the educational system, as research indicates that improving bureaucratic performance requires alignment between national and subnational systems of governance and management around the goal of learning for all (Bell et al., 2023; Crouch, 2020). This alignment involves both greater accountability and more delegation of roles and responsibilities. It also necessitates adopting a comprehensive systems perspective that acknowledges the intricate interdependencies and feedback loops within the system.

Yet, despite the potential benefits of problem-solving, traditional approaches have typically emphasized more centralized targets that are then cascaded down through accountability routines, with less of a focus on organizational learning for problem-solving that can impact behavioral changes. Put differently, "delivery approaches tended to be designed more through 'forward mapping' thinking about how to translate high-level policies into frontline changes than through 'backward mapping' thinking about how central actors can enable frontline workers to be more effective" (Bell et al., 2023, p. 45; Elmore, 1979). We therefore identified the need to undertake further research on the role of problem-solving approaches in tackling complex educational challenges and creating a conducive environment for learning at all levels of the education system (The Education Commission, 2023).

This paper explores how problem-solving approaches have been used in contexts where educational challenges are severe. The paper primarily reviews studies at the middle-tier level but, when relevant, studies at the national and school level were also included. The following five key questions guided the paper:

What is problem-solving in education reform, and how do strategies like feedback loops and autonomy enhance its effectiveness?

How do theories such as systems thinking and organizational learning inform problem-solving in education reform, and what insights do they offer about its underlying principles and mechanisms?

What are the critical organizational factors that shape problem-solving processes within education reform initiatives?

How do stakeholder engagement strategies and policy contexts interact to influence problem-solving outcomes?

What is the role of gender in problem-solving and decision-making within education reform efforts, and how does gender diversity influence the outcomes of these processes?

Methodology and limitations

This paper reviewed relevant literature on problem-solving in education reform, particularly within LMICs, but high-income countries were also reviewed when relevant. The research process began with a comprehensive keyword search, the following search terms were entered via Boolean search operators into the Google Scholar database: ("problem-solving" OR "collaborative problem-solving" OR "organizational learning" OR "problem-driven learning") AND ("developing countries" OR "less developed countries" OR "low income" OR "low and middle income") AND ("education"). These keywords were also applied across Scopus and Web of Science databases. In addition to academic sources, grey literature was incorporated to capture case studies that might not be available in traditional academic journals. This included publications from the World Bank and UNESCO, as well as a citation crawl based on the DeliverEd's database of case studies that explored elements of problem-solving. The narrow scope of this paper primarily looked at studies at the middle tier, so we examined results from only the first four pages of each database, which included approximately 40 studies; however, nearly half of these were excluded, as they focused on problem-solving at the student level (e.g., improving students' math problem-solving skills), which was outside the scope of this study.

The selection of case studies was guided by their relevance to the key questions of the paper and the strength of the evidence they provided. Emphasis was placed on studies that directly

addressed problem-solving strategies within educational reforms, particularly in LMICs, and that demonstrated methodological rigor. The case studies from South Africa, Brazil, and Ghana were specifically chosen due to their demonstrable success in applying problem-solving approaches in challenging educational environments. Data from the selected studies were extracted, focusing on the problem-solving approaches used, the outcomes achieved, and the contextual factors that influenced these outcomes. The extracted data were then synthesized to identify common themes, successful strategies, and areas where further evidence is needed.

This paper, however, acknowledges several limitations. The decision to limit the literature search to the first four pages of each database may have excluded relevant studies, potentially limiting the comprehensiveness of the paper. The inclusion of grey literature, while valuable for capturing practical insights, introduces variability in the quality and rigor of the sources. Additionally, different terms are sometimes used when describing problem-solving practices. Thus, additional studies were likely omitted in these cases. The case studies included in this paper are context-specific, reflecting the unique challenges and opportunities in South Africa, Brazil, and Ghana. The findings and conclusions, therefore, may not be fully applicable to other regions or countries with different educational contexts and challenges. Additionally, gaps still exist in research on the effectiveness of problem-solving approaches, troubleshooting challenges, collaborative forums, and organizational learning initiatives across diverse contexts and countries. These limitations highlight the need for further research to build a more comprehensive understanding of problem-solving in education reform.

What is problem-solving and why does it work?

Globally, countries employ diverse strategies to implement and address education reform, with problem-solving viewed as one key approach. Problem-solving involves the routinization of dialogue, coordination, and collaboration across individuals, divisions, or organizations to improve performance through better information sharing, the use of performance data, and idea exchange. It typically amplifies bottom-up approaches to addressing system change (Williams et al., 2021). This section begins with a framing of problem-solving as it relates to accountability, the dominant mode of education implementation. It then explores the theoretical underpinnings of why problem-solving is useful for thinking about systems change, and it ends with an overview of the critical elements of problem-solving to employ in practice.

Conceptual framework

To understand how education reforms can improve service delivery, two key pathways have emerged in the literature, each emphasizing different mechanisms for achieving results. These pathways, referred to as Pathway A (accountability-driven) and Pathway B (problem-solving) in the DeliverEd work, Figure 1, reflect long-standing debates in public administration and management theory, which in other disciplines are referred to as Theories X and Y or Route X and Y (Andrews et al., 2015; Chun & Rainey, 2005; D. Honig, 2022; McGregor, 1960; Rasul et al., 2021; Rasul & Rogger, 2018; Williams et al., 2021).

Figure 1. Problem-Solving Conceptual Framework
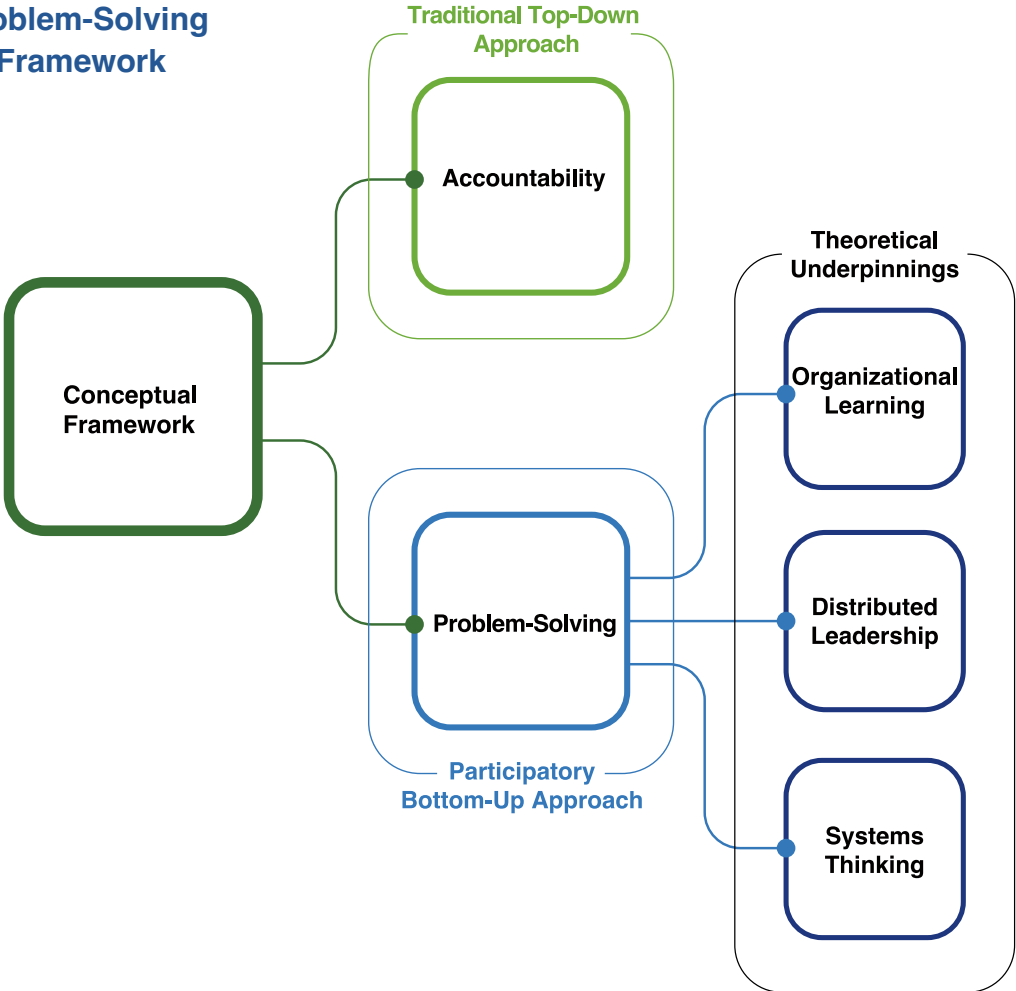
As defined by Williams et al. (2021), Pathway A emphasizes leveraging tools of accountability—such as performance monitoring and financial or nonfinancial incentives—to ensure that bureaucrats, school administrators, and other stakeholders increase their effort and meet predefined targets. This approach draws from classical theories of public administration, notably the principal-agent theory, which suggests that agents (e.g., school leaders or bureaucrats) may not inherently share the goals of their principals (e.g., policymakers) (Laffont & Martimort, 2002). Therefore, mechanisms of control and oversight are necessary to align their behavior with desired outcomes. Pathway A emphasizes the importance of rules, incentives, and accountability in motivating public sector employees. This pathway is also grounded in discussions about how performance-linked incentives can improve public service delivery (Andrews et al., 2015; Chun & Rainey, 2005; D. Honig, 2022; McGregor, 1960; Rasul et al., 2021; Rasul & Rogger, 2018; Williams et al., 2021). Recent studies by Duflo et al. (2012) and Rasul and Rogger (2018) have shown that attaching clear rewards and sanctions to measurable performance indicators can drive significant improvements in bureaucratic effort. However, while Pathway A focuses on compliance and meeting targets, it may limit innovation and adaptation, especially in complex environments. This approach is typically top-down, where problem-solving tends to occur within the context of resolving bottlenecks that prevent targets from being met. The responsibility for addressing these issues often lies with senior officials during high-level performance reviews, rather than with frontline actors who may be more familiar with local challenges.

In contrast, Pathway B emphasizes the importance of collaborative problem-solving. This approach argues that improving service delivery requires stakeholders at all levels to share ownership of goals and collectively solve problems as they arise. Rather than relying solely on top-down control, Pathway B seeks to build coordination routines, foster innovation, and encourage local adaptation of policies. Collaborative problem-solving benefits from theoretical concepts—such as organizational learning, distributed leadership, and systems thinking—which can help empower stakeholders, at all levels of the system, to make informed decisions and adapt policies to their environments to ensure sustainable educational improvements (Williams et al., 2021).

Theoretical underpinnings

As mentioned, bottom-up problem-solving is deeply rooted in theories such as organizational learning, distributed leadership, and systems thinking. These theories propose that learning is not a passive process but one of active engagement, where knowledge is both created and applied through real-world experiences (Coburn, 2016; M. I. Honig & Coburn, 2008; Lave & Wenger, 1991; Spillane, 2006; Vygotsky & Cole, 1978). These theories view educational systems as interconnected networks, where changes in one area create ripple effects that impact on the entire system.

Organizational learning involves the ongoing process of using knowledge and feedback to adapt and improve practices, making it essential for iterative problem-solving (Chang & Hughes, 2012). This framework promotes flexibility by encouraging institutions to remain open to change and willing to revise their strategies as new information becomes available (Nohrstedt & Parker, 2014). Leithwood et al. (2004) observed that educational systems

with strong organizational learning cultures were more successful in implementing reforms. Their success stemmed from the ability to engage in data-driven decision-making, where real-time feedback informed continuous adjustments. The capacity to learn from past experiences and implement changes in response ensures systems can continually improve their practices and outcomes. In educational reform, this approach is particularly relevant when local actors—like school principals and district officials—engage in ongoing problem-solving processes to address challenges specific to their contexts. A highly cited example of organizational learning in the United States examines central office administrators who were tasked with implementing school—community partnerships. They had to move beyond their traditional roles and engage in real-time problem-solving, learning to adapt their strategies in response to complex relationships and differing values among schools and community agencies (M. I. Honig & Coburn, 2008).

Distributed leadership emphasizes the importance of sharing leadership roles across different levels within an organization. This model fosters collaboration by involving a range of stakeholders in decision-making processes, which leads to more effective problem-solving (Harris & DeFlaminis, 2016). It shifts the focus from top-down leadership to shared responsibility, empowering teachers, school leaders, and staff to take ownership of their roles in driving change. In educational reform, distributed leadership has been shown to increase adaptability and the capacity for innovation, as local actors are directly involved in addressing the specific needs and challenges of their communities. Schools that practice this approach often exhibit a greater ability to respond to changing circumstances, resulting in more innovative and responsive solutions (Harris & DeFlaminis, 2016).

Systems thinking provides a holistic perspective by encouraging educators and leaders to view educational systems as interconnected organizations where changes in one area can influence others. This framework emphasizes adaptability and helps leaders recognize patterns and feedback loops within the broader system (Senge et al., 2010). Systems thinking fosters data-driven decision-making by enabling leaders to identify how different components within the education system interact with one another. For instance, the RISE Systems Framework uses systems thinking to highlight the relationships among actors at various levels—like policymakers, educators, and students—and how these interactions shape learning outcomes. Problem-solving in this context means recognizing and acting upon these feedback loops to ensure that education systems work more coherently toward improved outcomes. This framework also suggests moving beyond addressing only the "symptoms" of a problem and instead focusing on the underlying root cause (e.g., address why a school has no textbooks rather than just hand out textbooks) (Silberstein & Spivack, 2023; Spivack, 2021). This approach also strengthens collaboration, as stakeholders are encouraged to work together in addressing issues across the entire system. Leaders who adopt a systems thinking approach are better equipped to anticipate the ripple effects of changes and make informed decisions that consider the long-term impact on the organization (Senge et al., 2010). When systems fail to align on systems thinking, countries can be trapped in a "low-learning, low accountability, high-inequality equilibrium" (World Bank, 2018, p. 171).

Critical elements of problem-solving

In practice, problem-solving approaches can vary depending on a country and education system's context. Evidence shows that problem-solving can occur both horizontally (within the same level) or vertically (across different levels). It can be adapted to the type of reform implemented or to the different stakeholders involved. It may also adjust depending on a system's decentralization or on broader political systems within a country. In essence, problem-solving can look differently and work differently based on a number of critical factors unique to a context. While exploring and distinguishing the evidence on different types of problem-solving in greater detail is important for questions related to adaptability and replication, this deeper dive is beyond the scope of this paper. However, this paper does highlight the critical elements, Figure 2, that appear in most cases of effective problem-solving.

Figure 2. Critical Elements of Problem-Solving
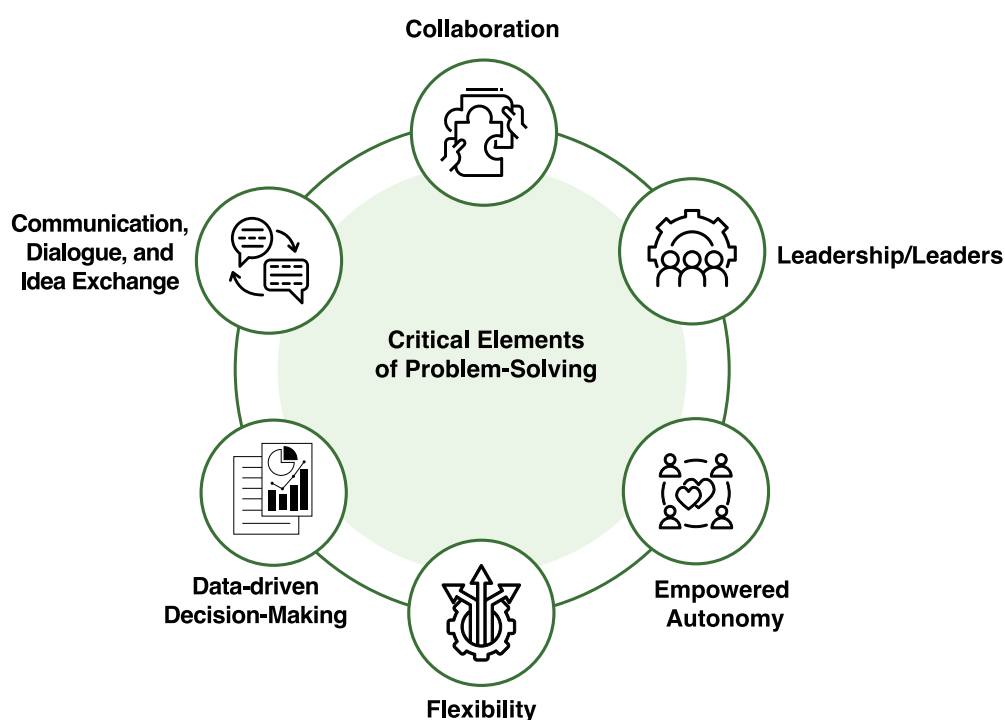
Effective problem-solving within education delivery systems relies heavily on **collaboration** across various teams and sectors. This collaborative approach is essential, as it facilitates the sharing of ideas, resources, and best practices and leads to innovative solutions tailored to the unique challenges of distinct locations (D. Honig, 2020). For instance, when district officers, teachers, and school leaders work together, they can identify specific issues affecting student performance and devise strategies that directly address these concerns. Collaboration ensures that problem-solving strategies are not only innovative but context-specific, addressing the needs of the communities they serve (Hargreaves & O'Connor, 2018; Spillane, 2006). Essential to effective collaboration is transparent **communication, dialogue, and idea exchange**. Whether through formal mechanisms like policy labs or informal peer networks, the ongoing exchange of ideas allows for greater adaptability and responsiveness within the education system. This also ensures that reforms are aligned to the needs of those involved and are context-specific (Kohli et al., 2016).

Additionally, **leadership** is crucial here; leaders at all levels play a key role in either supporting or hindering the adoption of problem-solving approaches (Andrews, 2014). Their ability to motivate and guide their teams is essential for integrating these strategies effectively. In addition to collaboration among educators, the involvement of parents, community members, and policymakers is crucial in ensuring that problem-solving strategies are aligned with the broader community needs, resulting in more sustainable and widely accepted solutions. When stakeholders come together to build a shared sense of culture and commitment to solving a problem, it also leads to **empowered autonomy** and capacity across the delivery chain (D. Honig, 2022).

Educational systems should be designed to adapt and respond effectively to feedback and changing circumstances. **Flexibility** allows education offices to quickly adapt their strategies in the face of challenges, such as budgetary constraints, by reallocating resources or modifying programs to meet new demands. This adaptability helps maintain the relevance and effectiveness of educational reforms over time, ensuring that the system remains resilient in the face of unforeseen challenges (Nohrstedt & Parker, 2014). Delivery units that incorporate flexibility into their operations are better equipped to navigate evolving needs and implement solutions that reflect the real-time challenges faced by their communities (The Education Commission, 2023; Nohrstedt & Parker, 2014).

Data-driven decision-making is another critical element of effective problem-solving. Continuous learning and improvement, supported by regular evaluation of implemented strategies, ensures that educational reforms remain responsive to changing circumstances. By utilizing data to identify trends, diagnose issues, and evaluate the effectiveness of interventions, education offices can develop targeted solutions that address specific needs. For example, analyzing data on student attendance, performance, and socioeconomic background allows district leaders to identify schools at risk of underperformance and implement targeted interventions, such as after-school programs or teacher training initiatives, that address the specific needs of these schools (Datnow & Park, 2018; Fullan, 2014). This evidence-based approach ensures that solutions are not only effective but also address the root causes of educational challenges.

The evidence of problem-solving from education and other sectors

In practice, problem-solving has been vital for addressing the complexities of education reform, as evidence suggests that shifting the focus of middle-tier professionals from supervision and compliance monitoring to continual professional support for teachers can enhance educational outcomes. A review of accountability interventions in LMICs indicated that high-stakes monitoring alone is often ineffective and, instead, approaches that combine accountability with support, capacity building, and constructive feedback are more successful in driving school improvement (Eddy-Spicer et al., 2019; The Education Commission, 2023). This reorienting can help motivate stakeholders toward a collective goal that does not constrain but rather builds collective action at all levels of the system (Crouch, 2020).

In Kenya, Piper et al. (2018) found that the Tusome literacy program successfully improved learning outcomes by applying problem-solving elements, such as iterative cycles of evaluation and adaptation to develop targeted instructional materials, and it provided regular teacher feedback. The program involved stakeholders at different levels of the system—teachers, students, and administrators—to identify the root causes of poor literacy performance. This approach led to measurable improvements in reading proficiency across the country. A success factor in this study included allowing teachers to make their own adaptations to lesson scripts. While historically the provision of scripts is often viewed as an accountability mechanism, this approach can actually "empower teachers' use of their own agency rather than controlling them … thus the level of autonomy and support (rather than control) should rise in parallel" (D. Honig, 2022, p. 33).

Similarly, Banerjee et al. (2016) studied remedial education programs in India and found that structured problem-solving approaches were key to improving learning outcomes for low-performing students. The study emphasized how targeted interventions, such as regular monitoring, enabled educators to tailor instruction to students' specific needs. This led to significant improvements in mathematics and language skills. Similarly, a Teaching at the Right Level (TaRL) program in India proved successful when district-level staff demonstrated strong leadership skills and provided ongoing support and training to cluster resource center coordinators (CRCCs), who in turn supported teachers and school leaders. District staff created spaces for new ways of decision-making processes and collaboration with CRCCs. This culture of shared ownership enhanced CRCCs' confidence, which helped foster a new model of dialogue and communication to problem-solve, which in turn aligned leadership strategies with local needs and empowered frontline stakeholders to encourage more effective and sustainable educational outcomes (Aiyar et al., 2015).

Coaching or mentoring in the education sector is also a problem-solving approach, which taps into people's "hidden potential" by addressing fears, pushing comfort zones, and aligning values and passions (Reiss, 2015). While there is less evidence on coaching or mentoring from LMICs, evidence on coaching and mentoring in education is well documented in high-income contexts (Huggins et al., 2021; Mangin, 2014; Reiss, 2015). A national study from the United States found

that approximately 50 percent of school leaders receive leadership coaching during their tenure, with many reporting that coaching support has a trickle-down impact that led to increases in teacher performance and student achievement (Wise & Cavazos, 2017). A study in Rwanda—which utilized coaching, mentoring, and professional learning communities to address bottlenecks at the middle-tier level—identified both horizontal improvements (e.g., improved perceptions to lead and greater collaboration with other districts) but also vertical improvements in the system, with the program positively increasing school leader intrinsic motivation and decreasing teacher absenteeism (VVOB Education for Development & Education Development Trust, 2017).

Sistema de Aprendizaje Tutorial (SAT), an alternative secondary education program in Latin America, employs a "learning-by-doing" approach for teachers to adapt and respond flexibly to local community needs. The program has reached over 300,000 students, and an evaluation of the program from Honduras has shown improvement in learning outcomes, women's empowerment, and civic responsibility (Robinson et al., 2019).

In Pakistan, the implementation of a top-down, accountability-driven delivery approach in the Punjab province benefited from the inclusion of problem-solving approaches. Originally, the reform, which focused on increasing learner enrollment rates, teacher attendance, and general school infrastructure, struggled to translate the overarching goals into tangible improvements at the school level. However, results from a qualitative study indicated that once local leadership became involved, with the chief minister of education personally attending meetings throughout the year to discuss progress goals with each district, there was a reinforced sense of ownership of the reform. His presence signaled a seriousness about the initiative when he began personally working with districts on data-driven decision-making to address and solve their learning problems (Bell et al., 2023).

In Kenya, a study found that the decentralization of education management empowered district education officers to employ problem-solving techniques to address specific local challenges. This approach led to significant improvements in literacy rates and student retention by allowing local leaders to innovate and adapt solutions that best fit their communities' needs (Duflo et al., 2015). Similarly, in Uganda, the School Facilitation Grant program engaged district education officials in problem-solving activities to monitor school performance and provide targeted support, resulting in improved school management and increased student attendance (Mugo et al., 2015). Evidence from the Big Results Now! program in Tanzania showed how local problem-solving initiatives by districts were able to address their specific needs. For example, one district collaborated with parents and the community to provide better data on school performance (Todd & Attfield, 2017). The authors suggest that clear objectives set by the government but with local autonomy is a more effective approach to addressing the needs of a complex education system.

Evidence also highlights the complex dynamics of problem-solving in education reform. The DeliverEd Sierra Leone case study reveals that while individual team members in the delivery unit were proactive in problem-solving, there was a lack of coordination and shared problem-solving culture among the Ministry of Basic and Senior Secondary Education (MBSSE) departments. Inconsistent adherence to scheduled meetings and formal structures suggests a need for further research to emphasize the importance of building a shared culture of problem-solving. Policy

considerations and lessons learned suggest that establishing consistent routines for problem-solving could improve progress tracking in MBSSE. Adopting a more structured and effective problem-solving approach could involve stakeholders in overcoming obstacles or deviations from the planned progress (Anderson & Bergmann, 2022).

A formalized example of a problem-solving approach is the Problem-Driven Iterative Adaptation (PDIA) developed by the Building State Capability program at the Harvard Kennedy School, which examines the intersection of management and behavior change through a "learning-by-doing" approach (Levy et al., 2016; Pritchett, 2015). Rather than implementing preconceived solutions, PDIA suggests developing solutions that are uniquely tailored to local contexts through an iterative process of trial, feedback, and adaptation (Levy et al., 2016; Pritchett, 2015). For example, in a district facing low student achievement, PDIA would involve local educators in identifying the specific barriers to learning, testing small-scale interventions, and continually refine these interventions based on real-time feedback until an effective solution is found. This approach empowers local actors to take ownership of the problem-solving process, ensuring that solutions are not only effective but also sustainable because they are developed and supported by those who will implement them. In Indonesia, the PDIA approach was adapted to four districts that all identified unique problems, entry points, and action steps specific to their needs, but together contributed to changing the country's overarching education system (Barjum, 2022).

While the primary focus of this paper is on the education sector, much of the literature on problem-solving is adapted from other sectors. Datnow and Park (2018) suggest that the success of problem-solving in other fields, such as business, can be translated into education. They argue that effective problem-solving requires learning from mistakes and adapting strategies to meet the evolving needs of students. Therefore, recognizing how problem-solving is utilized across sectors can provide important insights to increasing its use within education. A growing body of research has shown that primarily focusing on control and monitoring for performance improvement does not always achieve the intended results of an intervention (Andrews et al., 2013; D. Honig, 2018; Rasul et al., 2021; Rasul & Rogger, 2018). For example, in Ghana's public administration sector, relying solely on high-stakes accountability methods has not consistently encouraged efficient task completion in national bureaucracies (Rasul et al., 2021; Rasul & Rogger, 2018). In Nigeria, the Nigerian Civil Service reveals that granting bureaucrats more autonomy enhances project completion rates, whereas a focus on incentives and monitoring tends to correlate with lower completion rates (Rasul & Rogger, 2018). Additionally, the World Health Organization's strategy for combating malaria relies on a problem-solving approach that emphasizes continuous surveillance, real-time data analysis, and rapid intervention (World Health Organization, 2019). This strategy has significantly reduced malaria incidence in several regions, demonstrating the value of problem-solving in addressing complex, systemic challenges. Evidence from the education and other sectors highlights the effectiveness of problem-solving approaches in driving meaningful improvements. The versatility of these strategies, demonstrated by their successful application across different sectors, shows that systematic problem-solving, when applied thoughtfully, can lead to significant reforms and progress, even in resource-constrained environments. As education systems continue to evolve globally, adopting these proven approaches paves the way for more effective, adaptable, and impactful reforms.

The application of problem-solving in addressing country-level learning crises: Evidence, insights, and lessons learned

This section examines three case studies where problem-solving approaches were effectively employed to address significant learning crises. By analyzing what worked, as well as why and how it worked in these contexts, we can extract valuable insights that could inform broader educational reforms. The cases—Funda Wande in South Africa, Sobral in Brazil, and Ghana's implementation of delivery units—were carefully selected based on their demonstrable success in tackling foundational educational challenges through structured problem-solving approaches. These cases were chosen not only for their success but also for the diversity of their contexts, ranging from a nonprofit organization focused on early literacy in South Africa, to a municipal government driving significant educational improvement in Brazil, to a national reform effort in Ghana that spanned different regions with varying levels of resources. The strength of evidence was a key criterion in their selection, with each case being supported by rigorous evaluations. Funda Wande's effectiveness was validated through randomized control trials, while Sobral's and Ghana's reforms were substantiated by comprehensive longitudinal data analyses. These robust evaluations underscore the contribution of problem-solving approaches in enhancing educational outcomes.

South Africa: Funda Wande's approach to addressing the foundational learning crisis

Funda Wande, a South African nonprofit organization established in 2017, was selected as a case study due to its targeted approach to tackling the foundational learning crisis in South Africa. The organization's mission is to ensure that all children up to third grade can read for meaning by 2030. This goal was driven by the need to address severe challenges in the education system, particularly the lack of teacher expertise and the shortage of quality educational resources in local languages. These challenges had long contributed to ineffective teaching practices and inadequate support for learners, especially in underresourced communities (Samji & Kapoor, 2022). To overcome these challenges, Funda Wande employed a learning-by-doing strategy (PDIA's trademark) to begin addressing the country's learning crisis (Samji & Kapoor, 2022).

The first step in Funda Wande's approach was to thoroughly understand the root causes of the foundational learning crisis. The organization began by **collaborating with a broad range of critical education stakeholders**, including government officials, teachers, parents, and community leaders. Funda Wande placed significant emphasis on engaging key stakeholders early in the process to ensure that the interventions were aligned with the actual needs and challenges faced by educators and learners (Samji & Kapoor, 2022). This engagement helped them to identify the inequities that existed within the education system, particularly in resource allocation, financial support, and teacher training.

The organization identified two key entry points for intervention: foundational skills training and the development of educational materials in local languages (Samji & Kapoor, 2022). These focus areas were chosen based on the understanding that improving teachers' skills and providing quality resources in languages children speak and understand would be fundamental to improving learning outcomes. The emphasis on engaging stakeholders at every level of the education system, from national government to local communities, ensured that the interventions were relevant and sustainable. The organization noted that empowering local stakeholders was essential to drive change and sustain improvements, ensuring the longevity of the interventions beyond the initial implementation phase (Samji & Kapoor, 2022).

A core element of Funda Wande's strategy was its **commitment to iterative adaptation**. This learning-by-doing approach involved piloting interventions in selected provinces with particularly low literacy rates before rolling them out more widely. The interventions included the development of a formal teacher training program, which was delivered in both local languages and English. This program was supplemented by an in-service training initiative that used video content, complemented by biweekly in-person classroom visits from Funda Wande-trained coaches.

After the first six months of the pilot, the organization made significant adaptations based on feedback from the teachers involved. For example, Funda Wande recognized the need to provide written resources to accompany the videos, as teachers requested more tangible materials to support their learning. Additionally, the organization reshot the training videos in low-resourced, large-sized classrooms, rather than in small, private school settings, to better reflect the realities faced by most public-school teachers in South Africa (Funda Wande, 2019). **It was highlighted that these adaptations were crucial in making the training materials more applicable and effective in the actual teaching environments** (Samji & Kapoor, 2022).

A significant aspect of Funda Wande's strategy was to **build local capacity for the sustainability and scalability of its interventions** (Funda Wande, 2019). The organization worked closely with the government, particularly through a collaboration with the President's Youth Employment Service program. This partnership allowed Funda Wande to employ youth as teaching assistants (TAs) in foundational learning classrooms. The TAs received intensive training, ongoing mentorship, and opportunities for peer learning, all of which were designed to enhance their ability to support both teachers and students effectively (Ardington, 2023). Building local capacity through the integration of TAs was a strategic

move to ensure the sustainability of the program while addressing immediate classroom needs (Samji & Kapoor, 2022). This strategy provided much-needed support in classrooms as it addressed the government's concerns about the financial sustainability of the initiative by leveraging government-paid stipends to fund the TAs' involvement.

The effectiveness of Funda Wande's approach was demonstrated through a four-year randomized control trial conducted between 2019 and 2022. The study, which involved 120 schools and 5,000 learners, revealed significant improvements in foundational reading and mathematics skills among learners in Funda Wande-supported classrooms. By the end of grade 2, students in these classrooms scored higher on both the Early Grade Reading Assessment (EGRA) and the Early Grade Mathematics Assessment (EGMA) compared to their peers in nonparticipating schools. Furthermore, by grade 3, these students had achieved approximately 0.6 additional years of learning compared to their peers. The program was also cost-effective, delivering 2.13 years of high-quality education for every US$100 per child per year (Southern Africa Labour and Development Research Unit, 2024). With ongoing evidence and support, elements of Funda Wande's program have been integrated into several South African provincial education departments. For example, the program's flexible and iterative learning approach meant that provinces could locally adapt, tailor, and refine tools to their provincial needs, such as working with stakeholders to develop more cost-effective tools, illustrating the program's capacity to be effective at scale and its potential to reach schools most in need.

Brazil: Sobral's educational transformation

The municipality of Sobral, Brazil, was selected as a case study due to its remarkable educational transformation. Sobral rose from 1,366th place to 1st place in Brazil's Basic Education Development Index (IDEB) for both primary and secondary education between 2005 and 2017 (Loureiro & Cruz, 2020). This extraordinary improvement began with a series of reforms initiated by a newly elected mayor in 1997, who recognized the need to address the municipality's severe literacy crisis (Loureiro & Cruz, 2020). To fully understand the transformative journey of Sobral's educational reform, the following analysis highlights the problem-solving approaches that were instrumental in driving the change.

The educational reform in Sobral was initiated after diagnostic assessments conducted in 2000 and 2001 revealed a significant literacy crisis: half of all primary school students could not read a simple word. This alarming discovery prompted the leadership to focus on literacy as the central issue. **The government shared these assessment results transparently with the community**, making literacy the focal point of the reform efforts. The leadership engaged with a broad range of stakeholders, including parents, teachers, school leaders, and community members, to build a shared sense of responsibility (Inep/MEC, 2005). Meetings and radio campaigns were used to communicate the urgency of the literacy crisis and to **emphasize the collective role of all stakeholders in addressing the problem**.

> "During the meetings, it was common to see fathers and mothers saying that the school was "very good" or "excellent". Faced with these statements, the Municipal Secretary used to ask: "how can the school be good if it's not teaching your children?" The meetings weren't about pointing the finger of blame. No one said "the problem is the principal or principal, the teacher or teacher", but "everyone is responsible". The idea was to reinforce the need for transformation that would only be possible with everyone's participation. This process encouraged community participation. In addition to the meetings, local radio stations were an important means of communicating the new literacy policy proposals" (Inep/MEC, 2005, p. 52).

The reforms in Sobral included significant management and organizational changes at all levels of the education system. **The leadership increased school-level autonomy**, implemented monthly teacher training sessions, introduced a simplified pedagogy, and provided financial incentives to staff. These measures were designed to make schools more responsive to the needs of their students while ensuring accountability for educational outcomes. The reforms introduced by Sobral were about fundamentally changing how schools operated, making them more responsive to the needs of their students and more accountable for their outcomes (Inep/MEC, 2005).

A key aspect of Sobral's reform strategy was its iterative nature, characterized by continuous adaptation based on feedback. Initially, the reforms focused on improving infrastructure and increasing enrollment rates, but these efforts did not immediately lead to better learning outcomes. Following the disappointing results of the 2000 assessments, the focus shifted to literacy. External assessments were introduced and conducted twice a year, providing regular feedback on student performance. The use of regular external assessments allowed Sobral to continually refine its strategies, ensuring that they remained relevant and effective as the reforms were implemented (McNaught, 2022).

Sobral's reform process was heavily reliant on data-driven decision-making. The leadership used data from the regular assessments to guide the reform process, making informed decisions on where to focus resources and how to support struggling schools and students. The assessment results were shared transparently with all stakeholders, fostering a culture of accountability and continuous improvement. **The shift to data-driven decision-making was a key factor in Sobral's success, enabling leaders to move from addressing external challenges to focusing on internal, actionable solutions** (Loureiro & Cruz, 2020).

The reforms in Sobral **created positive feedback loops that facilitated real-time problem-solving**. The regular assessments and continual monitoring provided the data needed to quickly identify and address issues as they arose. This approach created a structured environment where schools and districts were continuously supported and held accountable (McNaught, 2022). Sobral's reforms included a strong emphasis on regular training and professional development for teachers. Monthly training sessions were held to improve teachers' skills and knowledge, particularly around literacy. Teachers were provided with guided lesson plans to ensure better sequencing and alignment of educational materials across the system (Inep/MEC, 2005).

Sobral's comprehensive approach to educational reform resulted in significant improvements in literacy rates. Four years into the reform, 89 percent of six-year-olds and 92 percent of seven-year-olds could read sentences, compared to just 34 percent and 49 percent respectively in 2001. Sobral's data-driven, collaborative approach offers valuable lessons for other regions in Brazil and beyond (Loureiro & Cruz, 2020).

In 2018, Ghana's Ministry of Education adopted a delivery approach to achieve the goals

Ghana: Implementation of delivery approach at the subnational level

outlined in its 2018–2030 Education Strategic Plan (Bell et al., 2023). This initiative, led by the National Education Reform Secretariat (NERS), aimed to enhance the implementation of national policies and improve coordination among national agencies, including the Ghana Education Service (GES). By 2021, GES, with the continued support of NERS, began implementing this delivery approach at the subnational level. The reform, among other things, emphasized problem-solving, enabling subnational actors to identify local challenges and develop tailored solutions (Bell et al., 2023). This problem-solving approach was characterized by elements such as problem identification, stakeholder engagement, management reforms, increased autonomy for regional, district, and school leaders, differentiated problem-solving strategies, and iterative, adaptive problem-solving.

> "Our descriptive evidence points toward benefits from problem-solving practices over top-down accountability, raising policy considerations for Ghana's current delivery approach and beyond" (Boakye-Yiadom et al., 2023, p.1).

At the subnational level, Ghana's delivery approach was designed to identify and address challenges within the education system. To achieve this, GES implemented stakeholder engagement forums, such as the Accounting to the Director-General (DG) forums and School Performance Appraisal Meetings (SPAMs). These forums provided a platform for **stakeholders to meet regularly, discuss challenges, identify problems, and collaboratively brainstorm solutions** (Bell et al., 2023).

The Accounting to the DG forum was particularly important at the regional level, where performance contract holders, such as district and school leaders, reported directly on their progress and the challenges they faced in implementing educational policies. **These forums focused on fostering a collaborative environment** where stakeholders could openly discuss obstacles without the pressure of punitive measures (Bell et al., 2023). Similarly, SPAMs were designed to bring together district and school leaders with other key stakeholders, such as parents and community leaders, to review school performance and identify potential areas for improvement. These meetings served as a crucial mechanism for collective problem identification, allowing diverse perspectives to be shared (Bell et al., 2023). However, despite the effectiveness of these forums in fostering stakeholder engagement and problem-solving, their implementation was often hindered by resource constraints. In several districts, SPAMs were not held regularly due to a lack of funds. This limited stakeholders' ability to engage in consistent problem-solving activities, thereby affecting the delivery approach's effectiveness (Bell et al., 2023). Despite these challenges, the delivery approach at the subnational level provided a structured framework for problem identification and stakeholder engagement.

A central component of Ghana's delivery approach at the subnational level was the introduction of level-specific performance contracts, which played a key role in driving problem-solving across regional, district, and school levels. These contracts formalized clear targets and responsibilities, ensuring that local leaders had the tools to address challenges specific to their contexts while aligning their efforts with the broader national goals set by GES (Bell et al., 2023). As part of this approach, school leaders signed contracts with their district leaders, district leaders signed contracts with their regional leaders, and regional leaders signed contracts with the DG of GES (Bell et al., 2023). While this partially served as an accountability mechanism, it also facilitated as a problem-solving approach where each leader was **empowered to set performance targets within their respective domains**. Through this management reform, leaders were encouraged to respond quickly to emerging challenges, collaborate with stakeholders, and adapt strategies to meet the distinct needs of their districts and schools.

The decentralized structure of the delivery approach was designed to facilitate localized problem-solving, granting subnational education leaders the autonomy to address challenges specific to their contexts. However, while resource constraints were present everywhere, regions with fewer resource constraints were more capable of leveraging their decision-making power for effective problem-solving. In contrast, leaders in areas with more resource constraints faced greater limitations that hindered their ability to fully capitalize on this autonomy (Bell et al., 2023). The performance contracts played a crucial

role in formalizing this problem-solving autonomy. These contracts outlined clear targets and outcomes, focusing on addressing local challenges such as resource management, teacher absenteeism, and infrastructure deficiencies. **Equipped with the autonomy to make decisions based on their unique circumstances**, regional, district, and school leaders in better-resourced areas were able to implement more efficient and responsive solutions, enabling them to solve local problems more effectively (Bell et al., 2023).

Problem-solving strategies differed significantly across districts based on resource availability. In districts near the capital, Accra, problem-solving took a backseat to structured accountability mechanisms. The well-resourced districts prioritized formal management practices, relying on accountability to meet performance targets, thus reducing the need for flexible problem-solving (Boakye-Yiadom et al., 2023). In contrast, especially in districts with fewer resources, problem-solving became the central focus. As a result, districts in these areas were pushed to **adopt creative, localized approaches to tackle their challenges**. They had to engage in more flexible and pragmatic problem-solving (Boakye-Yiadom et al., 2023).

The delivery approach at the subnational level emphasized iterative and adaptive problem-solving to tackle the unique challenges faced by districts and schools. In several districts, leaders adopted an iterative process by leveraging data from previous years to identify performance gaps and tailor interventions accordingly. For instance, in one district, district directors collaborated with school improvement support officers and schools to **address low performance using past data to inform their actions, demonstrating how iterative cycles of assessment and intervention were applied to improve outcomes** (Bell et al., 2023).

Additionally, regional leaders created adaptive problem-solving environments by implementing open-door policies. These policies enabled head teachers to raise issues and collaborate with district officials in real time to develop solutions. This approach **facilitated flexible and responsive problem-solving, ensuring that local challenges could be addressed promptly** and that interventions could be adjusted based on immediate feedback and available resources (Bell et al., 2023).

The delivery approach in Ghana led to improved stakeholder engagement through performance contracts and structured meetings like SPAMs and Accounting to the DG forums, where local challenges were addressed collaboratively. However, the impact varied across districts, with resource-poor areas struggling to hold regular meetings and effectively solve problems, while better-resourced regions used their autonomy to address issues like teacher absenteeism and infrastructure more successfully. Iterative problem-solving allowed districts to use past data to improve performance, and open communication between head teachers and officials helped resolve issues quickly.

Discussion and takeaways

This section draws on insights from the case studies of South Africa, Brazil, and Ghana, as well as the broader literature explored, to address and discuss the five research questions this paper aimed to address.

The role of problem-solving in education reform and the use of strategies to enhance effectiveness

Problem-solving in education reform refers to the process of continually identifying challenges, engaging stakeholders, and adapting solutions based on real-time data and feedback. The case studies provide strong evidence of how feedback loops and autonomy to make local decisions play crucial roles in enhancing the effectiveness of problem-solving approaches. For example, in Sobral, Brazil, the use of feedback loops to enhance and refine the student assessments was instrumental in the municipality's educational transformation (Loureiro & Cruz, 2020). In South Africa, the iterative adaptations during the teacher training pilot allowed the program to create more relevant and practical tools to enhance teaching (Samji & Kapoor, 2022). The studies from Ghana and Kenya highlight the necessity to balance accountability and autonomy, by giving district leaders and teachers the flexibility to adapt their performance contracts or lesson scripts to their own needs and local challenges. These strategies can foster empowerment and a sense of ownership, both of which are critical to the success of reforms (Bell et al., 2023; D. Honig, 2022; Piper et al., 2018).

How theories inform problem-solving and its underlying principles and mechanisms

The theories behind organizational learning, distributed leadership, and systems thinking highlight the importance of understanding the interconnectedness within educational systems, and how changes in one area can have ripple effects across the system. Organizational learning emphasizes the capacity of stakeholders to learn from past experiences and implement changes to continually improve their practices. An example of this is the ability to engage in data-driven decision-making as evident by the Sobral case study. When the initial reform did not produce the expected literacy gains, the government quickly shifted focus to address literacy more intensively. This process of ongoing adaptation, informed by data, enabled Sobral to refine its strategies, resulting in significant improvements in literacy rates over time (McNaught, 2022).

Additionally, studies from the United States, India, and Rwanda emphasize the importance of distributed leadership styles embedded in collaborative and peer learning to drive change and foster empowerment (Aiyar et al., 2015; VVOB Education for Development & Education Development Trust, 2017; Wise & Cavazos, 2017).

Systems thinking was evident in the case of Funda Wande, where the program recognized that improving foundational literacy required addressing multiple, interdependent components of the education system—namely, teacher capacity and resource shortages. The program did not focus solely on one area or input but instead adopted a holistic approach to ensure that learning outcomes could improve systemwide (Samji & Kapoor, 2022). In Ghana, systems

thinking is reflected in the way the national and local levels were aligned under the delivery approach. Although local leaders had limited autonomy to develop solutions, their problem-solving efforts were still aligned with national goals, ensuring that changes made at the district level contributed to broader systemwide educational objectives (Bell et al., 2023). This alignment highlights the systems thinking principle that different levels of the education system must work together to create cohesive and sustainable reforms.

The theories that ground problem-solving indicate that successful problem-solving in education reform is not about implementing static, one-size-fits-all solutions but rather creating flexible systems that can evolve based on different factors and contexts.

The critical organizational factors that shape problem-solving processes within education reform

Evidence from the case studies and the broader literature suggests several organizational factors play a crucial role in shaping the effectiveness of problem-solving processes within education reform. However, additional research is needed to explore other enabling factors to shaping problem-solving processes.

Across many of the examples provided, **leadership and local ownership** were two prominant factors shaping the success of the problem-solving process. In Sobral, leadership reforms allowed schools to introduce their own financial incentives for teachers, which empowered schools to take responsibility for their educational outcomes (Loureiro & Cruz, 2020). In Ghana, the decentralized leadership and management structure helped ensure that local leaders had the authority to tailor solutions to their unique contexts (Bell et al., 2023). The TaRL study from India built a **shared sense of culture around collaboration** to empower staff throughout the system (Aiyar et al., 2015).

Resource availability and adaptability are also critical determinants of the effectiveness of problem-solving processes. In South Africa, the innovative partnership with the government to employ youth as TAs ended up tackling two of the country's problems—the learning crisis and the high youth unemployment rate (Ardington, 2023). In Ghana, districts with limited resources adapted creatively to still address the needs of their community with fewer resources (Boakye-Yiadom et al., 2023).

The interaction of stakeholder engagement strategies and policy contexts to influence problem-solving outcomes

Stakeholder engagement and policy contexts work together to shape problem-solving outcomes. In Sobral, the local government actively involved parents, teachers, and community leaders in the reform process, creating a shared sense of responsibility for improving literacy outcomes (Loureiro & Cruz, 2020). This was also the case in Tanzania, where one district's approach to problem-solving was the involvement of families and the community (Todd & Attfield, 2017). This wide-reaching engagement fostered collective ownership of the reforms, with stakeholders actively participating in efforts to drive improvement. These examples of collaboration were further reinforced by the transparent sharing of literacy data, which helped align the community's efforts with the government's goals.

The role of gender in problem-solving and decision-making and the influence of gender diversity on the outcomes of these processes

Women in leadership roles are widely acknowledged as having a positive impact on society (Bergmann et al., 2022; Chattopadhyay & Duflo, 2004; Dhatt et al., 2017). In broader literature, studies suggest that gender diversity in leadership can improve the quality of decision-making by introducing a wider range of perspectives and experiences. For instance, studies in governance and corporate leadership have found that organizations with higher gender diversity tend to be more adaptable and responsive to challenges, as women leaders often prioritize collaboration and long-term planning (Anderson & Bergmann, 2022). This suggests that similar benefits could be observed in education reform if more attention were given to promoting gender diversity in problem-solving approaches. For example, a study from Chile highlights that female school leaders scored higher than their male counterparts in aspects related to solving and managing teacher-related challenges (Weinstein et al., 2023). In West and Central Africa, a study identified female leaders as more likely to take proactive steps in addressing student attendance problems through localized approaches (Játiva et al., forthcoming). Nevertheless, in the specific case studies reviewed in this paper or in the broader literature on problem-solving, there was no substantial evidence directly addressing how gender dynamics influence problem-solving and decision-making processes in education reform efforts, particularly in LMICs.

Evidence gaps and future areas of research

While this paper seeks to provide evidence of the effectiveness of problem-solving approaches in driving educational reform, several critical areas remain unexplored and warrant further investigation.

One significant gap is the role of problem-solving in the **long-term sustainability** of these reforms. The three case studies demonstrate short-term success, but more research is needed to understand how the problem-solving approaches can contribute to sustaining these interventions over time, particularly in the cost-effectiveness of these programs. The mechanisms that ensure the continuity and resilience of these reforms, particularly in varying political and economic contexts, require deeper examination to develop strategies that extend their impact beyond the initial implementation stage. Another area requiring further exploration is the **specific mechanisms through which stakeholder engagement translates into improved educational outcomes**. While stakeholder involvement is recognized as essential, the dynamics of these relationships and their direct impact on the effectiveness of problem-solving processes remain insufficiently understood. Future research should delve into how different forms of engagement—such as collaboration, communication, and decision-making—affect the success of educational reforms, and how these processes can be optimized for better outcomes. A formal identification strategy to disentangle the different types of problem-solving approaches would provide a rich overview of the many layers of problem-solving and the forms it can take in education reform.

Another critical gap is **the role of gender and marginalized groups in problem-solving and decision-making within educational reforms**. Very little evidence exists on this topic, and none of the evidence explicitly addresses how gender diversity among stakeholders or decision-makers influenced the outcomes of the reforms, nor did they consider how the inclusion of marginalized groups was incorporated into the process. This represents a significant omission, as understanding the impact of gender diversity is essential for developing more inclusive and effective strategies. Future research should investigate how gender dynamics contribute to or hinder the success of problem-solving approaches, to better understand the power dynamics at play and to ensure that reforms are equitable and are benefiting from diverse perspectives.

Conclusion

This paper highlights how problem-solving approaches have been used in addressing the complex challenges faced by education systems in LMICs. The evidence from the literature and the case studies from South Africa, Brazil, and Ghana demonstrate how iterative adaptation, data-driven decision-making, and inclusive stakeholder engagement can lead to significant improvements in educational outcomes. These examples illustrate that, when effectively applied, problem-solving approaches cannot only overcome immediate obstacles but also lay the groundwork for long-term systemic change.

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