Literacy Initiatives at scale: A focus on 'science to service gap' in the Indian context

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Abstract

The purpose of this paper is to thoroughly examine the practical implementation of literacy programs in public educational settings on a large scale. Room to Read aims to provide an in-depth analysis of the different perspectives that surround literacy, considering it as both a scientific process, and a socially constructed phenomenon that is influenced by various factors such as culture, language, and socioeconomic status.

Literacy is a socially constructed experience that is dependent on the linguistic and orthographic expectations of a given society. As a contemporary need across the world, it is emerging as a fundamental right for anyone trying to negotiate a complex matrix of information of the present day. And, more, literacy as a field has been enormously contributed to by cognitive neuroscience which insights into how the brain learns to read.

The present paper also delves into the concept of implementation as a domain of study in its own right and its practical application in the context of large-scale literacy programs. It draws insights from the experiences and best practices of different states, to shed light on the key factors that contribute to the successful implementation of such programs.

Through this exploratory analysis, we seek to provide a comprehensive understanding of the challenges and opportunities that emerge in executing literacy programs at a large scale which is an outcome of the interaction between continuously evolving pieces like policies, services, people, economics, and political landscape. The Science to Service gap situates itself with the diverse realities that exist in a country like India which leads to certain inefficiencies but also provides enormous opportunities for scalability.

Keywords

Science to service gap, Systems, Language, Literacy, Scale, Public education, Foundational literacy

Introduction

Reading is one of the fundamental skills that a child learns in life. It helps them access knowledge, discover new worlds, and participate fully in contemporary society. Despite its significance, there is a global learning crisis where millions of children are not acquiring essential reading skills. As of 2022, in low and -middle-income countries an estimated 70 percent of children in late primary cannot read and understand a simple story, up from 57 percent pre-pandemic. [4]

Developing strong reading skills is key to acquiring fundamental cognitive and socioemotional abilities. Additionally, reading has a strong correlation with other essential skills such as mathematics, science, and other domains.

For an extended period, conventional reading instruction has prioritized decoding skills and basic comprehension. Reading was believed to be a universal process that could be standardized and taught in a standardized manner, with a focus on the ability to decode and comprehend text. However, this approach has been challenged by recent research. Reading is a complex cognitive process that involves the integration of various skills, including phonemic awareness, phonics, fluency, vocabulary, and comprehension. Moreover, reading is a culturally situated activity that is influenced by social, linguistic, and cognitive factors. Therefore, a more comprehensive and contextualized approach to reading instruction is needed, one that recognizes the diversity of learners and the complex nature of reading.

It is widely recommended by experts in the field that a scientific approach be employed when constructing literacy models and designing instructional strategies.

When it comes to designing and delivering educational programs at a large scale, it can be helpful to utilize a combination of the Scientific approach towards Reading contributed by neuroscience and Implementation as a field of study. Cognitive neuroscience provides valuable insights into how students learn to read, while Implementation studies focus on strategies for effectively implementing evidence-based practices in real-world settings. By bringing together these two approaches, education professionals can create programs that are not only grounded in research but also designed to be practical and effective in the classroom at a large scale with multiple variables.

Evolution of Literacy

The widespread practice of reading is a relatively recent development in human history, with its origins dating back to the 4th millennium BCE in Mesopotamia. This is when writers began creating symbols on clay tablets to represent animals such as goats and oxen, marking the inception of the art of writing and reading. By the 5th century BCE, Greek historian Herodotus was already delivering readings of his latest works to audiences at the Olympic Games, and by the first century CE, it became a social convention in Rome for authors to read their work aloud.

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[4] "Campaign." 2019. World Bank. 2019. https://www.worldbank.org/en/who-we-are/news/campaigns/2019/literacy-makes-sense.

The Brahmi script, which emerged in the 3rd century BCE, played a crucial role in the dissemination of written language and the expansion of literature in India.[5]

In India, literacy has transformed over time. Pre-colonial education was more varied while British rule saw the rise of government-funded English primary schools from 1881to1947. However, this progress was limited. After gaining independence, providing free and mandatory education for all children aged 6-14 became a national priority. Although the number of high schools in 2000-01 exceeded the number of primary schools at the time of independence, the level of literacy remained a concern, particularly because of the varying literacy rates among different Indian states.[6]

With the advent of digital media, reading practices have undergone significant transformations. Today, children are interacting with both paper and screen literacy endeavours, they are keenly immersed in experiences where paper and screen work synergistically. In India, classrooms face a dual challenge of a digital divide and linguistic and socio-economic diversity. In such a scenario, it becomes crucial to understand and identify the emerging patterns in designing and implementing a model in ever evolving environment.

So, it is crucial to remain cognizant of the newer learnings from cognitive neuroscience-driven reading practices and their impact on individuals and society.

'Science' of Reading

The goal of reading is to construct meaning of the text and the world around the reader. In the past few decades, extensive research has yielded a comprehensive model known as the 'science' of reading, which is based on the fundamental cognitive mechanisms involved in reading. It is a vast, interdisciplinary body of scientifically based research about reading and issues related to reading and writing.[7]

It highlights the significance of structured activities that facilitate students to read with comprehension. It has been established that fluency alone does not guarantee comprehension. The 'Science' of Reading provides valuable guidance on incorporating phonological awareness, phonics and word recognition, fluency, vocabulary, oral language, and text comprehension[8]. It is crucial that all these elements are explicitly taught and gradually integrated, much like the strands of a rope.

Understanding the script density and their impact on Literacy gains

A significant amount of research on literacy is conducted through empirical studies of alphabetic writing systems, such as English. The general assumption is that the findings from studying English language learning can be applied to how the brain learns other languages. However, this assumption requires more supporting evidence when tested in other languages. This is mainly because languages have diverse visual representations and differ in their conceptual structure.

5 "Writing - Alphabetic Systems | Britannica." n.d. Www.britannica.com. https://www.britannica.com/topic/writing/Alphabetic-systems.

6 Mishra, Yudhisthir. 2023. "EDUCATION in INDIA: PRE-INDEPENDENCE SCENARIO." Www.academia.edu, January.
https://www.academia.edu/99153465/EDUCATION_IN_INDIA_PRE_INDEPENDENCE_SCENARIO.

7 API, Shopify. 2021. "The Science of Reading." Little Learners Love Literacy. March 30, 2021.
https://www.littlelearnersloveliteracy.com.au/blogs/why-llll/the-science-of-reading.

8 Jiban, Cindy. 2022. "The Science of Reading Explained." NWEA. January 25, 2022. https://www.nwea.org/blog/2022/the-science-of-reading-explained/.

Over the past decade, many studies have shown that orthographic consistency is a key factor in determining the rate of reading acquisition across languages (Ziegler & Goswami, 2005) [9] The different levels of transparency of letter-sound mapping in various orthographies have been found to influence reading development across languages. in highly transparent languages (Italian, Greek, and Spanish), children averaged 87% accuracy rates of high-frequency words by the end of first grade, while accuracy rates in less transparent languages (Danish, French) were lower (e.g., 80% in Danish and French, and 34% in English).[10]

Reading is characterized by understanding, although understanding is labeled in different ways (e.g. comprehension, meaning-making), success with this language process requires that one fully comprehends the expressed, interprets between and beyond the lines of text, and constructs personal meaning with the text. All that it requires, also reading a cognitively complex activity. Initially, it involves decoding words, but reading also requires thinking about messages built with them. Reaching full and deep comprehension of texts involves close reading, thinking, analysis, evaluation, synthesis, and integration of ideas (Beers & Probst, 2013: Shea &Robets,2016).[11]

India at a glance: complexity and context linguistic

India, one of the most culturally and linguistically diverse countries in the world, boasts a vast array of languages and dialects, each with its own set of unique characteristics. From Hindi and Tamil to Bengali and Marathi, the linguistic diversity of India is truly remarkable. However, this diversity also poses a significant challenge for literacy instruction, particularly in contexts where languages lack a script.

Many indigenous communities in India have languages that are transferred orally from one generation to the other, without a written script. This makes it challenging to develop effective literacy instruction approaches, as traditional methods may not be well-suited for these contexts. As a result, alternative approaches that recognize the unique characteristics of these languages and dialects are needed to ensure that everyone has access to quality education, regardless of their linguistic background.

The complexities are present at both the oral and written levels. The orthographies of South and Southeast Asia descend from the ancient script and are called Indic alpha syllabaries. Orthographies such as Bengali, Gujarati, Lao, Tamil, and Sinhala each have similar but well-defined orthographic principles. Unlike other phonologically-based writing systems, where the orthographic representation of a specific sub-lexical level dominates, mapping to phonology in Akshara-based orthographies is context-dependent. The Akshara-based psycholinguistic tradition has drawn upon the role of orality in literacy development (Patel and Soper, 1987; Patel, 1996, 2004), the articulatory features of single akshara and word-level prosody (Pandey, 2007, 2014), the nature and scope of Akshara-language mapping (Sircar and Nag, 2013; Nag, 2014), the cognitive bases of reading acquisition (Prakash et al., 1993; Nag and Snowling, 2012) and the profiles of impairment in adult clinical conditions (Karanth, 2002). For a comprehensive theory of reading and spelling development, a delineation of the cognitive-linguistic mechanisms associated with a writing system that has multiple levels of sub-lexical representation is required.

[9] Katzir, Tami, Rachel Schiff, and Young-Suk Kim. 2012. "The Effects of Orthographic Consistency on Reading Development: A within and between Cross-Linguistic Study of Fluency and Accuracy among Fourth Grade English- and Hebrew-Speaking Children." *Learning and Individual Differences* 22 (6): 673–79. https://doi.org/10.1016/j.lindif.2012.07.002.
[10] https://doi.org/10.1016/j.lindif.2012.07.002. (https://www.sciencedirect.com/science/article/pii/S1041608012000933)
[11] Shea, Mary, and Maria Ceprano. 2017. "Reading with Understanding: A Global Expectation." *Journal of Inquiry & Action in Education* 9 (1): 2017. https://files.eric.ed.gov/fulltext/EJ1158259.pdf.

Teaching literacy in non-English speaking countries is a complex task that requires a deep understanding of the local languages, cultural preferences, and educational systems. It is important to recognize that these countries have multilingual environments with diverse writing systems, and existing research tends to overlook this complexity. Most studies on literacy instruction in these contexts tend to focus on alphabetic languages and orthographies, which do not fully capture the nuances and challenges of teaching literacy in these settings. Also, with the rapidly changing economy leading to opening the gates for the future, English is becoming an aspirational language among communities creating a demand to be included in a curriculum at primary grades. Multilingualism is a social reality in India, in a classroom setting one can observe multiple languages that children bring in with curriculum mandates of teaching a state language and a second language, which can lead to increased complexities in learning a language.

Therefore, to provide effective literacy instruction, it is essential to contextualize instruction within the local languages and writing systems starting from the languages of the children.

Research suggests that foundational skills such as reading are better taught in the early years of education. NEP (National Education Policy) and NIPUN (National Initiative for Proficiency in Reading with Understanding and Numeracy)[12] policies are initiatives that act as stepping-stones in recognizing the crucial role of early literacy development in setting a strong foundation for children's education and overall success.

In essence, NIPUN serves as an essential tool for advancing literacy goals by integrating the learnings from implementation study into the education system. Through their emphasis on foundational skills, contextualization of literacy, and the development of evidence-based practices, they provide a roadmap for effectively bridging the gap between research findings and practical application in real-world educational settings.

Educational policies are evolving to integrate the scientific principles of reading into practice. Properly contextualizing literacy instruction is paramount, particularly in countries where multilingualism is prevalent among the populace.

Implementing Evidence-Based Reading Practices: Opportunities and Challenges

The cultivation of effective reading practices within multilingual environments warrants the recognition of language and writing system disparities. The proposition of a uniform approach to evidence-based reading practices in African and Asian countries may not be the best solution, as these regions face unique challenges and opportunities stemming from their diverse languages, cultures, and education systems. Consequently, the development of reading practices tailored to the specific linguistic and cultural contexts of these regions is of utmost importance for optimal success.

African and Asian countries often have diverse linguistic backgrounds, with many languages and dialects coexisting within the same geographical area. For instance, in the state of Madhya Pradesh, one of the largest states in India, Hindi is regarded as one of the official languages of the state[13]. However, in a single classroom in Madhya Pradesh, one may come across students speaking Hindi, the languages of Bundeli, Bagheli, Nimari, Marathi, Sindhi, Urdu, and Malwi. On account of migration to this central state, the influence of other regional languages such as Kannada or Telugu also prevails. With the presence of diversity in language backgrounds, it is

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[12] Bharat, Nipun. 2021. "Ministry of Education Government of India National Initiative for Proficiency in Reading with Understanding and Numeracy GUIDELINES for IMPLEMENTATION." https://www.education.gov.in/sites/upload_files/mhrd/files/nipun_bharat_eng1.pdf.

[13] "Geographical Map." n.d. Www.slbcmadhyapradesh.in. Accessed February 5, 2024. https://www.slbcmadhyapradesh.in/geographical-map.aspx#:~:text=Hindi%20is%20the%20official%20language.

extremely difficult to develop standardized literacy instruction programs that cater to the needs of all students.

Furthermore, the cultural nuances and preferences in these regions play a major role in shaping literacy instruction. With numerous overlapping and intersecting caste, class, gender identities, and hierarchies, the scope for marginalization also increases exponentially, introducing even more complexities into the system. Understanding and incorporating these cultural aspects into evidence-based practices are crucial for successful implementation. This poses a significant challenge for implementing evidence-based reading practices, as traditional approaches may not be universally effective across these varied linguistic and cultural contexts.

Studies in non-alphabetic languages purport that models developed for reading in English-speaking children are not universally applicable. Script structures play a crucial role in the development of reading skills, as different scripts require different cognitive processes for decoding and comprehension. In an alphabetic script, phonological information is encoded at the phoneme level whereas in an alpha-syllabic script like Kannada, Malayalam, Tamil, etc., encoding happens both at the syllable and phoneme levels.[14] Due to this dual representation of phonological information, in alpha-syllabic languages, both phoneme and syllable awareness are important for reading where syllable awareness is more essential than phoneme awareness (Nag et al. 2018).

Additionally, the majority of the research has been conducted with monolingual children. In South Asia and Southeast Asia however, children are often exposed to multiple languages from a young age, making them bilingual or multilingual. It would be interesting to see how these language dynamics and the interplay between different scripts impact literacy acquisition and reading outcomes.

It is also important to understand that the educational systems in these regions may vary widely, with different policies and initiatives aimed at promoting literacy and education. Understanding and aligning evidence-based reading practices with these diverse educational systems is essential for effective implementation. The implementation of nationwide policies such as the NEP and the NIPUN Bharat Mission, may help streamline the process, however, a variety of systemic challenges continue to prevail.[15]

Evidence based implementation: Paving the Way for Reading Advancement

Implementation science is a relatively emerging field that provides conceptual frameworks and effective techniques for improving the implementation of interventions and innovations in various settings, including education. It offers practical strategies and instruments that can help educators and project leaders effectively incorporate new ideas and practices into classroom functioning, ultimately leading to better outcomes for students. The use of implementation science enables education professionals to identify potential challenges to successful implementation, develop effective implementation plans, and closely monitor and evaluate progress to ensure that their efforts are successful. There is a growing body of evidence on evidence-based practices establishing 'what works' but scaling these interventions through government systems often necessitates multiple iterations to ensure fidelity.

Given the importance of creating positive and effective learning environments for students, implementation science is a valuable tool for educators and project leaders who are committed to

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[14] Nag, Sonali, Markéta Caravolas, and Margaret J. Snowling. 2010. "Beyond Alphabetic Processes: Literacy and Its Acquisition in the Alphasyllabic Languages." *Reading and Writing* 24 (6): 615–22. https://doi.org/10.1007/s11145-010-9259-6.

[15] Bharat, Nipun. 2021. "Ministry of Education Government of India National Initiative for Proficiency in Reading with Understanding and Numeracy GUIDELINES for IMPLEMENTATION." https://www.education.gov.in/sites/upload_files/mhrd/files/nipun_bharat_eng1.pdf.

improving educational outcomes. By utilizing the strategies and tools provided by this field, they can enhance the delivery of interventions and innovations, leading to improved results in the classroom. "Implementation is now recognized as the link between science and service and is studied. Evaluations of successful efforts to make full and effective use of innovations to benefit citizens and society have led to the rapid expansion of implementation science" (Fixsen et al. 2015). According to Durlak and Dupre (2008), successful implementation can result in programs being 3 to 12 times more effective, and they concluded that "there is credible and extensive empirical evidence that the level of implementation affects programs outcomes".[16]

Before initiating an intervention, implementation science tools can help to understand the complex features of the system, the key actors that interact within it, and the systemic factors that may aid or hinder program implementation. Such inquiry builds the space to visualize the design and delivery cycle and relationships within a system, based on which granular planning of a project design and operational strategies can take place.

During the process of implementing model practices, the success of a model depends on adaptability as it will further ensure that it works well in a specific place or a community. An important component of implementation science thus, focuses on identifying barriers and threats to implementation, enabling researchers, educators, and policymakers to develop strategies to combat obstacles and achieve successful implementation. It is crucial to re-evaluate the situation at every stage of implementation to identify new challenges or threats that may hinder the benefits of successful implementation from reaching the smallest blocks.

Another important component of implementation science is the assessment of implementation strategies. It is not enough to develop evidence-based practices; we must also ensure they are being implemented with fidelity and achieving the desired outcomes. While innovative practices cannot be emphasized enough, it is emphasized enough, it is also equally important to have a thoughtful and participatory plan to make them work in practice. By exploring why and how an intervention/innovation works or why it fails, researchers and practitioners can identify the most effective approaches for promoting the widespread adoption of evidence-based practices in the science behind reading. In the context of literacy and reading, more particularly, the utilization of evidence-based practices is critical, but while the utilization of a scientific lens helps researchers develop more accurate models, it is important to acknowledge that literacy does follow a scientific gaze but is socially constructed and deeply rooted in people's experience to create meaning out of the text. With the emergence of brain science and psycholinguistic research, we have been able to gain some valuable insights into the cognitive processes involving reading. However, it is impossible to separate reading from the emotional, cultural, and social dimensions.

Understanding this distinction, that there exist differences between literacy both as a constructed phenomenon and when put into practice, is a key component to recognizing the need for implementation science and the science-to-service gap that persists, despite the development of the most comprehensive models.

Non-profit organizations and state governments in India are paving out solutions to create strategies that can lead to sustainable literacy gains at scale.

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[16] Durlak, Joseph A., and Emily P. DuPre. 2008. "Implementation Matters: A Review of Research on the Influence of Implementation on Program Outcomes and the Factors Affecting Implementation." *American Journal of Community Psychology* 41 (3-4): 327–50. https://doi.org/10.1007/s10464-008-9165-0.

Need for the Incorporation of Implementation Science while Developing Literacy Intervention Models

The need for these strategies arises from the recognition that one-size-fits-all approaches to implementation are often ineffective. In the real-world scenario, there exist a variety of systemic factors that are beyond the control of researchers or developers of interventions

Implementation science helps bridge the gap between science and service by providing a systematic approach to translating evidence-based interventions into real-world practice. By incorporating implementation science principles into the development of models, non-profit organizations can increase the likelihood of successful and sustainable implementation of evidence-based reading practices (A.V and Rao 2023).[17]

The principles of scalability and maintaining standardization to ensure sustainability and the creation of long-term impact are thus important to ensure the development of effective models. The benefit of a science that can account for a variety of components operating within a systemic framework is a more dynamic and individualized approach to service delivery and increases the likelihood of sustainability and high-quality outcomes (Franks and Schroeder, 2013). It is therefore important, to consider a variety of strategies for effective implementation when considering the science behind reading. Contextualization within planning the implementation, particularly when scaling up interventions while maintaining standardization, is guided by principles that balance the need for flexibility with the need for adherence to core elements that ensure the efficacy of the intervention. This is specifically needed in the case of literacy models, where the context and needs of learners may vary significantly (Fixsen et al. 2015).

To ensure that literacy models can effectively cater to the diverse environments upon scale-up when implemented, it is important to keep the essential core intervention components for effectiveness, while also making necessary adaptations based on local context, resources, and population needs. This may include modifying instructional materials, training teachers on culturally relevant strategies, and ensuring that the intervention is linguistically appropriate for multilingual learners.

While innovations are indeed useful, they must be practical and usable. Standardization is supported by having clear descriptions of the innovation, including its philosophy, values, essential functions, and operational definitions. This helps ensure that the intervention is teachable, learnable, and doable in practice across different contexts (A.V and Rao 2023).

Creating an enabling environment that can support the interventions is critical. This refers to the policies, systems, and structures within an organization that need to be accommodated for effective implementation. These should evolve as the intervention scales, without losing sight of the necessary standardization. Regularly obtaining feedback from stakeholders and evaluating the process and outcomes of the implementation provides information for refining and standardizing the intervention during scaling.

Overall, implementation science in the context of scaling up interventions while maintaining standardization is guided by principles that balance flexibility with adherence to core elements (Fixsen et al. 2015).

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[17] Bauer, Mark S., and JoAnn Kirchner. 2020. "Implementation Science: What Is It and Why Should I Care?" *Psychiatry Research* 283 (January): 112376. https://doi.org/10.1016/j.psychres.2019.04.025.

Transforming Foundational Literacy landscape in Uttarakhand under the USAID-SERI Project

Initiated in 2015, Scaling-up Early Reading Intervention (SERI), aimed at demonstrating – (a) an effective model towards improving reading outcomes among primary grade children, and (b) an innovative approach for scaling NGO-led interventions through the government system. One of the intervention states was the northern state of Uttarakhand. The intervention which initially was initiated in 50 government schools in Dehradun district, was scaled-up across 504 schools in Champawat district in 2016. The results of the external impact evaluation study conducted after two years of intervention in SERI schools showed that school children made 1.5 to 2 times greater progress than their comparison school counterparts on the various reading skills assessed. Additionally, the results from the SERI Program study suggested that the impact of the program was sustained even when it was scaled up across larger geographies supporting the effectiveness of the scale up model as proposed by RtR.

With evidence from the field, Room to Read team started engaging with state government towards replicating the key learnings and principles from SERI schools across the state of Uttarakhand. This was before launch of New Education Policy which came in force across India in 2020. However, the pandemic and extended school closures in 2020-2022 led the SERI team to curate remote learning modules in response to COVID-19.

After much negotiation on scope and sequence of the letters to be taught, in 2023, key principles and programmatic inputs of SERI were adopted by Uttarakhand Government for a state-wide scale-up. During this period, SERI's instructional materials and capacity-building modules were scaled up for the entire state. The SERI project produced notable innovations such as co-developing contextual children's literature with the state government which were translated into four languages - Hindi, Garhwali, Kumaoni, and Jaunsari. Additionally, to bolster monitoring across the state, Room to Read collaborated with the State Council for Education Research & Training (SCERT) Uttarakhand to develop the Foundational Literacy and Numeracy (FLN) digital assessment tool – Pragati Application, designed to track student progress in real-time and provide support accordingly.

The SERI intervention has been instrumental in transforming school education in Uttarakhand, reaching 13 districts, 11,452 primary schools, benefiting over 400,000 students, and 23,115 teachers. Its success highlights the importance of using various implementation science tools to scale-up a evidenced based foundational literacy program.

Two case studies from India

Organizations such as Room to Read India are partners with respective state governments in scaling up the literacy program under the Foundational Literacy and Numeracy (FLN) Mission in various states. The programs are large-scale, comprehensive foundational literacy programs aimed at benefitting all primary grade students in government schools of the state. With the use of science behind reading and implementation models, non-profits have been able to effectively

support the government and scale up their intervention programs. Below are the case studies from Uttarakhand[18] and Madhya Pradesh.

Madhya Pradesh launched Mission Ankur in 2021, which is a state-wide Foundational Literacy and Numeracy (FLN) initiative supported by a consortium of non-profit partners. This initiative is being led by the Rajya Shiksha Kendra (RSK) and is a result of the introduction of the National Education Policy (NEP) and NIPUN policies. Mission Ankur aims to provide comprehensive support to students in Grades 1 and 2 to develop their FLN skills through teaching-learning materials, training, and supportive supervision.

With a scale-up as a first step, it came with its set up challenges like resource allocation, scaling teacher training and support, and adapting the program design to a different school setting.

One of the primary obstacles was to align the educational syllabus of the state with the Foundational Literacy framework and competencies. This led to an overhaul of the curriculum to include explicit reading and numeracy proficiencies emphasized by the program and ensuring a seamless integration with the existing syllabus framework. After much negotiation on scope and sequence of the letters to be taught the curriculum was revamped. But the lack of contextual reading material, localized to the specific cultural and linguistic context of Madhya Pradesh, posed a significant challenge. In addition, the lack of space and resources to create a comprehensive library of reading materials exacerbated the issue. To combat this issue, a dedicated reading corner was established in each classroom, ensuring that children had access to age-appropriate reading material. To ensure scalability across the state, workshops were conducted, and local authors were invited to develop content modelled on local contexts.

Another challenge faced in the implementation of the program in Madhya Pradesh was the need to train and support teachers in delivering effective FLN instruction. To enhance the teachers' comprehension of FLN skills, instructional techniques, and assessment methods, comprehensive professional development initiatives like in-person training, and digital self-paced courses were introduced. The teachers received guidance on integrating supplementary books and allocated reading periods into their daily classroom routines to maintain a structured pedagogy.

The unique challenged faced while implementing the program in Madhya Pradesh was the presence of multi-grade classrooms. Due to limited resources and small classroom sizes, schools opted to combine students from two or three different grades into a single classroom. This posed a significant challenge as it required teachers to differentiate their instruction and cater to the varied needs of students at different grade levels, all within a limited time frame. To effectively cater to the varying levels and capabilities of students in a classroom, it was imperative to devise flexible instructional techniques and resources. To tackle this challenge, professional development initiatives were introduced to equip educators with the skills needed to differentiate instruction and modify materials for multi-grade classrooms.

Some learnings: ways to scale up

When literacy models are implemented, it is important to ensure that they are guided by the principles of scalability and maintaining standardization to ensure sustainability and long-term impact which government systems can own and drive independently. The benefit of a science that can account for a variety of components operating within a systemic framework is a more dynamic and individualized approach to service delivery and increases the likelihood of

sustainability and high-quality outcomes (Franks and Schroeder, 2013). It is therefore important, to consider a variety of strategies for effective implementation in the science behind reading.

When scaling up interventions, contextualization is key. It involves balancing flexibility with adhering to a core set of principles to ensure the intervention works effectively.

- While scaling up, it is essential to maintain the fidelity of core intervention components that are critical to its effectiveness. At the same time, adaptations may be needed to fit the local context, resources, and population needs. This may include modifying instructional materials, training teachers on culturally relevant strategies, and ensuring that the intervention is linguistically appropriate for multilingual learners.

- Using cycles such as Plan-Do-Study-Act can help to incrementally adapt and improve the intervention while monitoring fidelity and outcomes. Regularly obtaining feedback from stakeholders and evaluating the process and outcomes of the implementation provides information for refining and standardizing the intervention during scaling.

- Having dedicated teams helps in managing the complexities of scaling up interventions. Team members ensure that the standardized processes are followed, adaptations are appropriately made, and the intervention retains its effectiveness in new contexts. Capacitating the monitoring and coaching cadre in the system and setting them up for success for any changes that are made.

- Overall, implementation science in the context of scaling up interventions while maintaining standardization is guided by principles that balance flexibility with adherence to core elements (Fixsen et al. 2015)

Conclusion

Through the course of this paper, we find that while implementing reading programs in diverse classroom settings poses various challenges, some strategies and interventions can be employed to address these challenges and ensure the success of the program. The science-to-service gaps exist because the translation and implementation of evidence-based practices into real-world settings are often complex and multifaceted.

To overcome these challenges and bridge the science-to-service gap, it is crucial to adopt implementation principles and frameworks. In the case of Madhya Pradesh, we find that the implementation of the large-scale program required not only training teachers on differentiating instruction and adapting materials but also addressing socio-economic disparities among students and providing adequate resources and support to ensure equitable access to reading programs.

The end goal of creating a sustainable and scalable literacy program can only be achieved through effective implementation strategies that address the unique challenges of diverse classroom settings. The primary research on English as a language has led to the creation of models that are often too rigid to adapt to the needs of culturally and linguistically diverse students. There is a need to contextualize the literacy program and make it more socially relevant along with the practice of implementation models.

The UN Development Goals highlight the need for equitable and inclusive education for all, and a key component of achieving this goal is ensuring that all children have the opportunity to acquire proper reading skills. Therefore, it is imperative that implementation models is leveraged to advance the science behind reading and ensure that evidence-based practices are effectively implemented in diverse classroom settings to ultimately improve student outcomes and close the literacy gap.

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