

IS SEEING BELIEVING?

Insights into how teacher beliefs shift after implementing the Teaching at the Right Level program



Teachers who believe in their own capabilities and that of their students can be more effective teachers. A major challenge in lower- and middle-income countries is that too many teachers do not believe every student can learn, often because students underperform in classes that are overambitious, and teachers might not have the skills to tailor lessons to learner needs. We examine how teacher beliefs change over the course of implementing Teaching at the Right Level (TaRL), a program that is more targeted to remedial learners than the traditional curriculum. In TaRL, students learn basic skills quickly, over just several weeks, allowing teachers to see learning progress. We present descriptive findings that seeing is believing: TaRL shifts beliefs in some areas, indicating that teacher beliefs are malleable.



Educational quality, teacher beliefs, and learning

Higher-quality classrooms are associated with improved academic and socio-emotional skills ([Araujo et al., 2016](#); [McCoy and Wolf, 2018](#)). Quality is measured not just by academic instruction but also teachers' approach to organization, emotional support to students, and beliefs in student capabilities. These beliefs – shaped through academic assessment, gender, race, socio-economic status, and other background factors – can have profound effects on student learning ([Wolf and Brown 2023](#); [Filmer et al., 2021](#)).

A central challenge in many low- and middle-income countries (LMICs) is that teaching quality and beliefs about student ability are simultaneously low and work together to hinder learning in the classroom. For example, in a study of 20,000 teachers across nine LMICs, [Sabarwal et al. \(2022\)](#) showed that over 40 percent of teachers believed there was little they could do to educate students of uneducated parents. In the same study, a similar share of teachers felt that their teaching would have little effect if the students were not reaching grade-level expectations. An experiment that tested Peruvian primary school teachers' biases showed that teachers consistently had higher expectations of middle-class compared to poor students and evaluated poor students less favorably even when poor students performed equally as well as their middle-class peers ([Farfan Bertran et al., 2021](#)). In Botswana, we found that less than half of teachers believed in the statement “every child in this school is capable of learning all basic operations,” meaning addition, subtraction, multiplication, and division.

Like teaching quality, beliefs can change through training and experience ([Lowell and McNeill 2024](#); [Lehmann-Grube et al., 2023](#); [Kaur 2024](#)). If beliefs

can affect learning and they are changeable, then programs that improve classroom quality and improve beliefs could offer an additional boost to addressing the learning crisis in LMICs.



350 Teachers



122 Schools



6 Regions

Our study looked at how teacher beliefs changed as teaching quality changed

We examine how beliefs shift in the context of a program that improves teaching quality especially for struggling learners: Teaching at the Right Level (TaRL). We surveyed nearly 350 government teachers across 122 schools and six regions of Botswana before they participated in TaRL training and after they implemented TaRL numeracy for one implementation cycle, to understand how the experience of implementing TaRL changed their beliefs about themselves and their students. Questions related to teachers' own beliefs in their ability to teach struggling learners, capabilities of all their students, teaching practices, and knowledge of their students' ability compared to assessed ability. The pre-post findings we present are not causal but provide a sense of how teachers' beliefs might change as they learn to teach in a way that is a large departure from their business-as-usual classroom teaching.

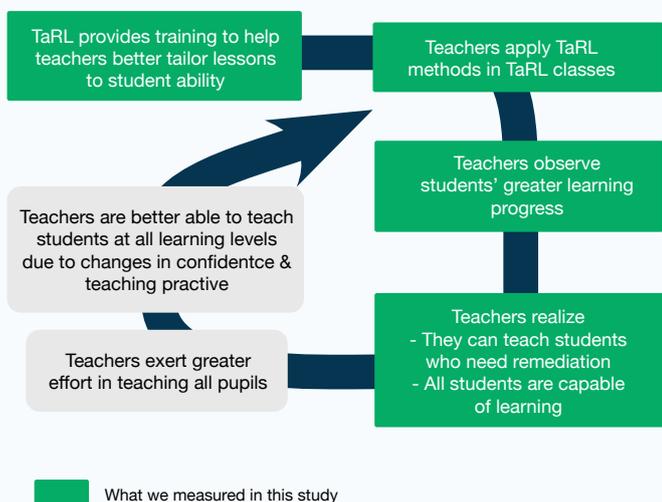


Hypothesized pathway from TaRL implementation to shifting beliefs

[TaRL](#) is a remedial math and literacy program that groups students by ability rather than age or grade and uses fun and interactive activities to activate learning. TaRL’s central philosophy is that students learn best when the lesson is at students’ “level,” in contrast to many curricula in LMICs that are too advanced for the majority of learners in a particular grade. In Botswana, government teachers deliver TaRL to standard 3 to 5 students (ages ~8 to 11) over 30 school days during one-hour daily lessons. TaRL teacher training offers teachers new strategies and techniques for teaching foundational skills. Our organization, [Youth Impact](#), supports the Government of Botswana in scaling TaRL across the country ([Curtiss Wyss et al., 2023](#)).

TaRL’s central objective is to improve learning outcomes; multiple randomized trials have demonstrated its effectiveness in achieving this goal ([Banerjee et al., 2001](#); [Banerjee et al., 2017](#); [Duflo et al., 2024](#); [Angrist and Meager 2023](#)). A less-studied TaRL outcome is teacher beliefs in their own abilities and that of their students. As discussed above, teachers who believe their students are teachable can be more effective teachers. In Figure 1 below, we show a hypothesized pathway from a teacher gaining better skills to teach students of all abilities, to teachers being able to see how their efforts lead to student learning, to teachers’ improved confidence in their own abilities to teach and that of their students to learn, to teachers engaging more in teaching, and improved teaching quality.

Figure 1: Teacher training leads to shifting beliefs to improved teaching and learning

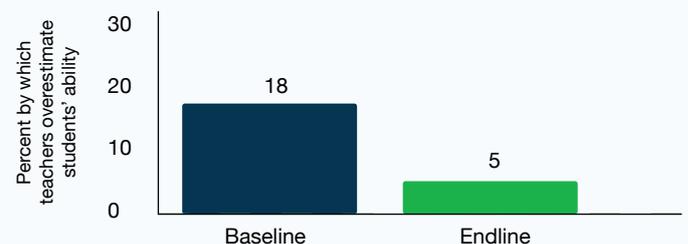


Diagnostic ability and willingness to set lessons independently improved

A key feature of TaRL is formative assessments that allow teachers to “level” children and place them in groups that correspond with their learning needs. In Botswana, we also use daily assessments – called a “problem of the day” – that allow teachers to check in on learning progress. Diagnosis is central to the TaRL model. As teachers are better able to appreciate students’ learning challenges, teachers are able to tailor lessons to their learners rather than following a curriculum that may not meet students’ needs. Research has shown that diagnosis – or mis-estimating students’ performance – is a barrier to learning in LMICs ([Djaker et al., 2023](#)). This is even more acute with underperforming students and especially in mathematics.

Consistent with this research, we found that prior to receiving TaRL training, teachers overestimated their students’ mathematics ability by about 18 percentage points (Figure 2); this overestimate was starkest at the most advanced division level, where teachers overestimated students’ ability to divide by 42 percentage points (not shown). After implementing TaRL this figure shrunk by 20 percentage points for division and by 13 percentage points overall. This reduction was primarily due to teachers gaining more accurate information about students’ skill levels, along with some improvement in student learning, i.e., scoring higher and thus their scores moved closer to teachers’ estimates.

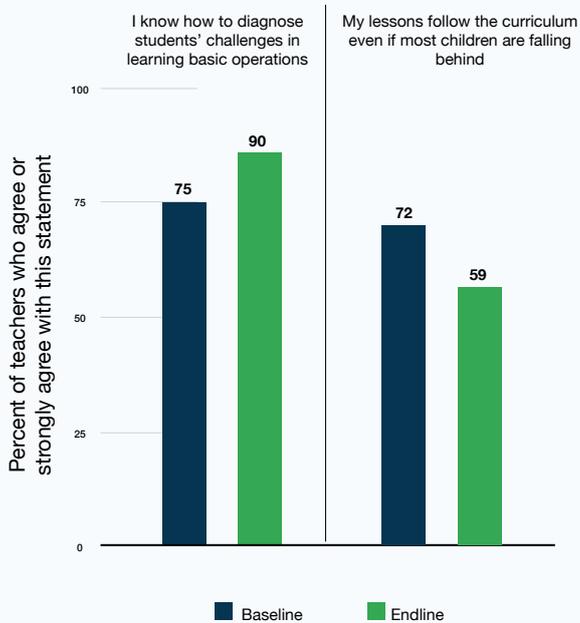
Figure 2: Teachers’ assessment of their students ability improved with TaRL



As teachers’ knowledge about students’ skill level improved, so did their diagnostic ability. The share of teachers reporting that they were able to diagnose students’ challenges in learning basic mathematics operations grew by 15 percentage points after implementing TaRL (Figure 3). As teachers diagnose better, they are better able to adjust their lessons to meet learner needs. We found that teachers also reported that after implementing TaRL they were

less likely, by 13 percentage points, to follow the standard curriculum in their own classroom, i.e., outside of the TaRL context, when their students couldn't keep up with it; although over half (60 percent) of teachers still said they would follow the curriculum even if their students were falling behind.

Figure 3: Teachers reported that their willingness to diagnose and “right-size” their lessons improved after implementing TaRL

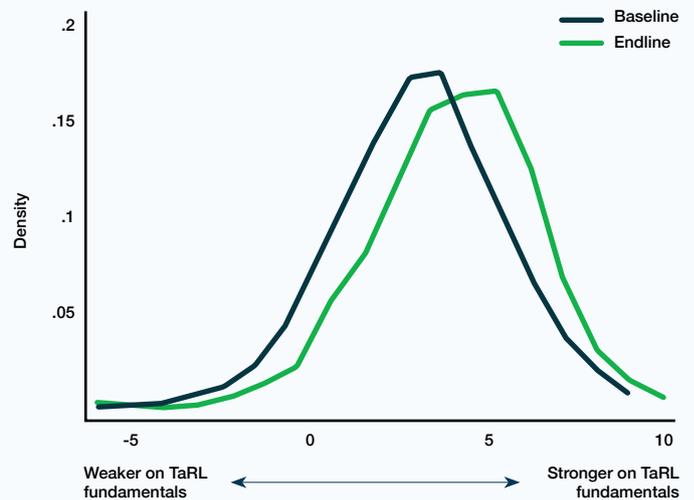


Seeing students improve led to increased teacher confidence in their own abilities and that of their students

Another key element of TaRL’s theory of change is that as teachers begin to diagnose learning challenges better and tailor lessons to meet those challenges, students learn more. Respondent teachers on average saw approximately 60 percent of students gain at least one mathematics operation over one 30-day TaRL implementation cycle; the share of innumerate children dropped from 31 to 6 percent (not shown). Improved learning was also reflected in altered teacher beliefs. After implementing TaRL, the share of teachers agreeing that all children in their school were capable of learning basic operations grew by 10 percentage points, albeit from a low baseline of 48 percent. Teachers also reported that they gained greater confidence in their teaching ability, with the share of teachers reporting that they could help even the lowest performing students learn mathematics growing also by approximately 10 percentage points. In Figure 4, we aggregate characteristics fundamental to delivering TaRL (diagnosis, pacing, sub-grouping by ability, capability to teach low performers,

and belief that all children can learn), placing them on a -10 to +10 scale. We find that exposure to TaRL shifted these characteristics by about 0.36 standard deviations or about 1 point on the scale.

Figure 4: After implementing TaRL, teachers scored higher on a scale related to TaRL belief and practice fundamentals



Implications for program design and further research

We have shared preliminary evidence that “seeing is believing” in the case of TaRL. While our design measures teacher perceptions before and after implementing TaRL without a comparison group and thus is not causal evidence, we hope that it lays the groundwork for future practice and research around teacher beliefs in the context of targeted instruction. Here we share three key recommendations related to TaRL program design and research.

- 1 Incorporate belief-shifting goals into teacher training.** If teacher beliefs are shiftable and they can have a positive impact on student learning, then helping teachers realize their potential and that of their students could be critical to any teacher training that aims to improve quality. If even after implementing TaRL 40 percent of teachers don't feel that all children in the school are capable of learning basic operations and 10 percent of teachers don't feel they are capable of helping low-performing students learn, these beliefs could dampen the effects of remediation programs. Currently many trainings focus on quality alone without consideration for teachers' beliefs in student potential. Trainings might want to focus on teacher beliefs as a priority even prior to teaching the fundamentals of remediation.

2 Measure spillovers from TaRL classes to core classes. While this study provides evidence that beliefs may shift with improved teaching and differentiation strategies, it also opens areas for further inquiry related to the benefits of targeted instruction. A key outstanding question is whether this shift in teacher beliefs “spills over” to TaRL teachers’ core daily classes. For example, if a teacher now believes that all children are capable of learning and they are more capable of teaching struggling learners, does this perception extend outside of TaRL, say when teaching fractions or time or geometry in core classrooms? Answering this question would require causal evidence, most likely using a randomized design with a non-TaRL control group.

3 Use iterative research methods to identify ways of encouraging more “seeing.” While we find some preliminary evidence that TaRL can bring about more “seeing,” we need more research about how to shift beliefs among more teachers. Even after TaRL implementation, only 58 percent of teachers believed that all children in the school were capable of learning basic operations. The teachers we surveyed had only implemented TaRL for one 30-day cycle. It is possible that teachers need a greater “dose” to generate more belief shifting. Identifying this optimal dose could be useful for program planning. At Youth Impact, we use a rapid iteration methodology called A/B testing, which randomly assigns students/teachers/schools to two variations of TaRL (A and B). Implementers could use A/B testing to assess whether multiple cycles of TaRL implementation have a greater effect on beliefs. It is also possible that enough teachers aren’t seeing the learning results. A/B testing would also allow implementers to try different methods of demonstrating results, such as during refresher training, TaRL graduation ceremonies, using different visuals, etc.

We are grateful to the Bill & Melinda Gates Foundation for supporting this project. Contact abeatty@youth-impact.org or visit www.youth-impact.org for more information about this study or TaRL.

References

Angrist, Noam, and Rachael Meager. “Implementation Matters: Generalizing Treatment Effects in Education.” Blavatnik School of Government Working Paper no. 2023-054 (December 2023).

Araujo, M. Caridad, Pedro Carneiro, Yannú Cruz-Aguayo, and Norbert Schady. “Teacher Quality and Learning Outcomes in Kindergarten.” *Quarterly Journal of Economics* 131, no. 3 (2016): 1415–1453.

Banerjee, Abhijit, Rukmini Banerji, James Berry, Esther Duflo, Harini Kannan, Shobhini Mukerji, Marc Shotland, and Michael Walton. “From Proof of Concept to Scalable Policies: Challenges and Solutions, with an Application.” *Journal of Economic Perspectives* 31, no. 4 (Fall 2017): 73–102.

Banerjee, Abhijit V., Shawn Cole, Esther Duflo, and Leigh Linden. “Remedying Education: Evidence from Two Randomized Experiments in India.” *The Quarterly Journal of Economics* 122, no. 3 (August 2007): 1235–1264.

Duflo, Annie, Jessica Kiessel, and Adrienne M. Lucas. “Experimental Evidence on Four Policies to Increase Learning at Scale.” *The Economic Journal* 134, no. 661 (July 2024): 1985–2008.

Djaker, Sharnic, Alejandro J. Ganimian, and Shwetlena Sabarwal. “Out of Sight, Out of Mind? The Gap between Students’ Test Performance and Teachers’ Estimations in India and Bangladesh.” *EdWorkingPaper* no. 23-750 (March 2023).

Farfan, Maria Gabriela, Alaka Holla, and Renos Vakis. *Poor Expectations: Experimental Evidence on Teachers’ Stereotypes and Student Assessment*. Policy Research Working Paper no. 9593. World Bank, 2021.

Filmer, Deon, Vatsal Nahata, and Shwetlena Sabarwal. *Preparation, Practice, and Beliefs: A Machine Learning Approach to Understanding Teacher Effectiveness*. Policy Research Working Paper no. 9847. World Bank, 2021.

Kaur, Jalnidh. “How Much Do I Matter? Teacher Self-Beliefs, Effort, and Education Production.” Working paper, University of Glasgow, October 15, 2024.

Lehmann-Grube, Sabine K., Anita Tobisch, and Markus Dresel. “Changing Preservice Teacher Students’ Stereotypes and Attitudes and Reducing Judgment Biases Concerning Students of Different Family Backgrounds: Effects of a Short Intervention.” *Social Psychology of Education* 27 (2024): 1–38.

Lowell, Benjamin R., and Katherine L. McNeill. “Changes in Teachers’ Beliefs: A Longitudinal Study of Science Teachers Engaging in Storyline Curriculum-Based Professional Development.” *Journal of Research in Science Teaching* (2022).

McCoy, Dana C., and Sharon Wolf. “Changes in Classroom Quality Predict Ghanaian Preschoolers’ Gains in Academic and Social-Emotional Skills.” *Developmental Psychology* 54, no. 8 (2018): 1582–1599.

Sabarwal, Shwetlena, Malek Abu-Jawdeh, and Radhika Kapoor. “Teacher Beliefs: Why They Matter and What They Are.” *The World Bank Research Observer* 37, no. 1 (February 2022): 73–106.

Wolf, Sharon, and Autumn Brown. “Teacher Beliefs and Student Learning.” *Human Development* 67, no. 1 (2023): 37–54.

Wyss, Molly Curtiss, Ghulam Omar Qargha, Gabrielle Arengé, Tendekai Mukoyi, Maya Elliott, Moitshepi Matsheng, and Karen Clune. “Adapting, Innovating, and Scaling Foundational Learning: Four Lessons from Scaling Teaching at the Right Level in Botswana.” Brookings Institution (April 2023).