

HEART

HIGH-QUALITY TECHNICAL ASSISTANCE FOR RESULTS



ESRC – FCDO RAISING LEARNING OUTCOMES (RLO) PROGRAMME

A synthesis of outputs produced from Call 1: ‘Effective Teaching’

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List of abbreviations

ASER	Annual Status of Education Report
CWD	Children with disabilities
LLP	Literacy Laboratory Project
LMIC	low- and middle-income countries
PCT	Pedagogies for Critical Thinking
R-SPQ2F	Revised two-factor Study Process Questionnaire
RLO	Raising Learning Outcomes
SAT	Sistema de Aprendizaje Tutorial
SEL	Socio-Emotional Learning
TEACH	Teaching Effectively ALL Children
TIPPS	Teacher Instructional Practices and Processes System

1 Introduction: Improving learning outcomes through effective teaching

Globally, robust evidence that has resulted from several decades of research on the critical determinants for raising pupil attainment has established that teacher effectiveness can be argued to be the most important determinant of student achievement (Hanushek, 2011; Azam & Kingdon, 2015; Bau & Das, 2017; De Talence, 2017). Estimates from the United States have suggested that a difference of one standard deviation for teaching effectiveness can yield up to 20% of a standard deviation change in pupil achievement (Hanushek & Woessman, 2011). A recent review across a range of contexts has found that the difference between high and low performing teachers is equivalent to multiple years of schooling (Beteille & Evans, 2019). This existing body of research has focused on 'who teachers are' – characteristics such as gender, age, qualifications, tenure etc. – as well as 'what teachers do', in terms of successful teaching and pedagogical practices and their subject, content and pedagogical knowledge, etc. (USAID, 2015; Glewwe & Muralidharan, 2016; Bold *et al.*, 2017). However, despite consensus around the important role of teachers, notions of how to measure teaching quality have been more contested given that any quality measure encompasses a range of characteristics, competencies, behaviours and attitudes, many of which either cannot be observed or cannot be easily measured. Identifying and measuring the 'teacher effect' is important not only for the recruitment and retention of teachers but also for evaluating programmes that focus on improving teaching quality and effectiveness.

Given that improving the quality of teaching is seen as an important mechanism for enhancing children's educational outcomes and addressing disadvantaging factors that create barriers to education, there has been a corresponding growth in national policies and educational interventions that engage teachers and emphasise teaching quality. Efforts that have sought to improve teaching quality have focused on pedagogic interventions and teacher professional development, or on the teachers themselves, such as increasing the numbers of female teachers, engaging community-based teachers and other such initiatives.

The Covid-19 pandemic has had a significant impact on teachers and teaching globally. At the height of the pandemic, more than 63 million teachers were directly affected by the crisis.¹ Research has also shown that teachers' roles during the pandemic expanded from mainly educational to a broader and more holistic range of functions, given that they were not only expected to provide continued and adapted learning opportunities but also vital health, safety and psychosocial information and support to students – whilst coping with the impacts of the pandemic themselves (Rose *et al.*, 2021).

Recognising the critical role that teachers play in children's lives and educational outcomes, the first funding call in 2014 under the ESRC-DFID Raising Learning Outcomes (RLO) programme focused specifically on funding new research into 'effective teaching'. The RLO programme aimed to enable more effective policies and interventions by providing policymakers and practitioners with concrete ideas on how to improve learning for all and an understanding of how these ideas will translate to their specific contexts and institutions. A portfolio of research was funded with the intention of improving the knowledge base around the complex relationships between elements of the education system, the context in which they are embedded, and the dynamics operating within the system and how they impact upon efforts to raise learning outcomes for all. Three annual research calls have taken different but complementary themes within this overall focus on interactions between system elements, context and dynamics and how all three of these impact on raising learning outcomes. Call 1 focused on effective teaching as a system element, Call 2

¹ <https://en.unesco.org/news/over-63-million-teachers-impacted-covid-19-crisis-world-teachers-day-unesco-urges-increased>

focused on challenging contexts, and Call 3 focused on the dynamic of accountability. In total, 30 projects are funded through the RLO programme across these three themes (ESRC & DFID, 2019).

This paper synthesises the evidence produced by 12 projects funded under Theme 1 on effective teaching.² This synthesis is based on the review of available literature produced by the RLO-funded projects across the first call as well as relevant outputs from the Impact Initiative.³ It forms the first of three such syntheses, with the other two focusing on 'Challenging Contexts' (Call 2) and 'Accountability' (Call 3). These syntheses aim to present common and differentiated findings across the RLO research grants – focusing particularly on what the research tells us regarding how to improve learning outcomes, how these findings are situated within the wider literature on education and improving learning outcomes, and policy lessons and achieving impact emerging from this analysis. The syntheses focus specifically on important cross-cutting themes such as gender and girls' education, education for children with disabilities, gauging access to education, equity and education systems. Table 1 summarises the evidence discussed in this synthesis paper. Figure 1 illustrates the geographic spread of where the projects under this theme are based.

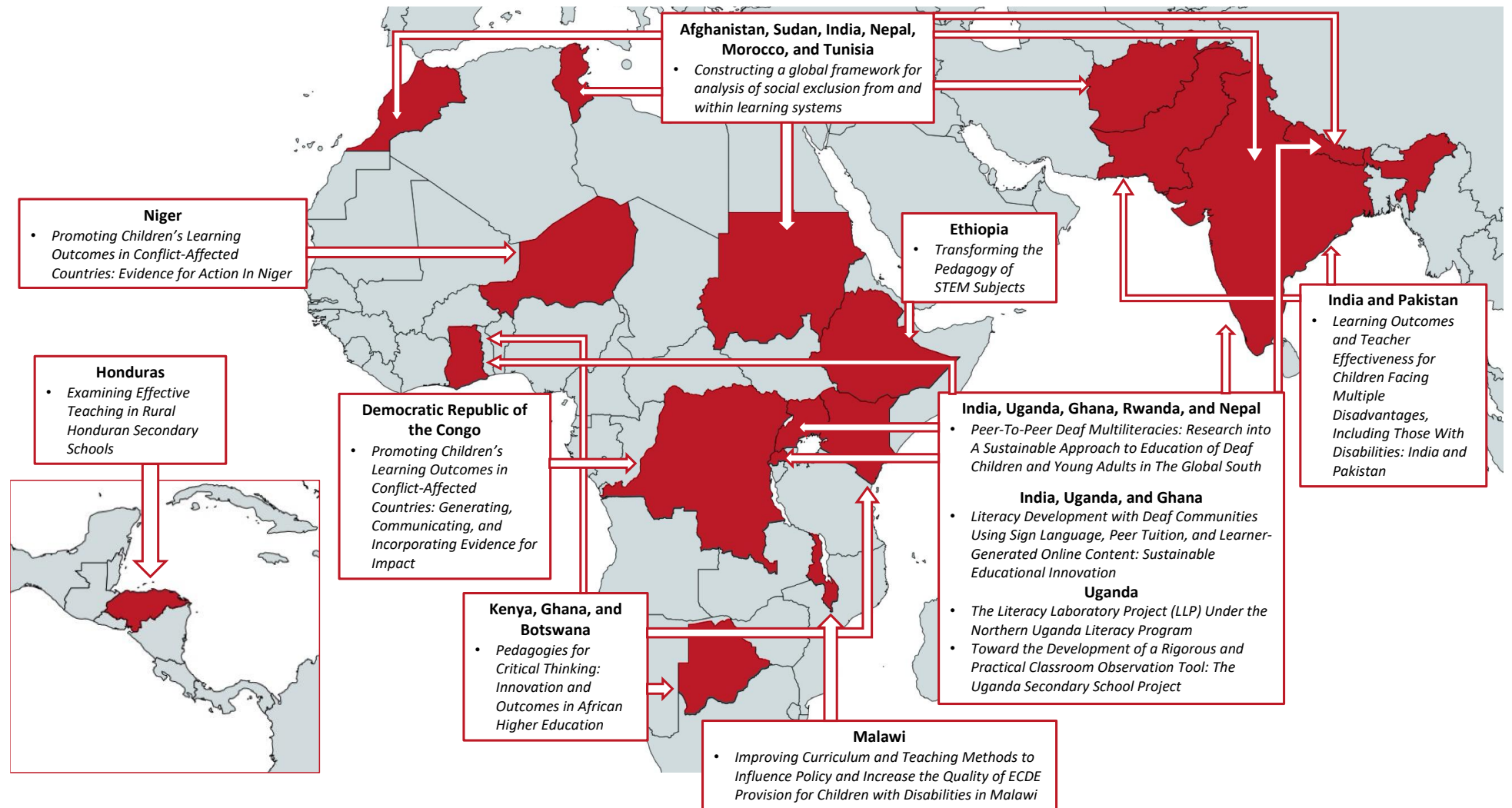
Table 1: RLO evidence on 'Effective Teaching'

	Number of outputs
Journal article	43
Book chapter(s)	6
Working paper, technical paper, or background report	11
Conference paper, presentation, or abstract	2
Policy brief	5
TOTAL	67

² Blogs are an important tool for reporting programme impact, especially given their immediacy and the longer timeframe needed to produce formal outputs through journals, book chapters, and book publications. Blogs were reviewed as a form of programme output, but they were not included in this paper, as the blogs reviewed reflected themes and findings that were later formalised in other outputs.

³ The Impact Initiative website highlights research from two separate programmes, The Raising Learning Outcomes Programme highlighted in this synthesis, as well as The Joint Fund for Poverty Alleviation Research. The site aims to identify synergies between the two projects and provide support both collectively and individually to grant holders. The site is linked [here](#). Relevant outputs include four Research for Policy and Practice reports, nine Impact Stories and one briefing paper.

Figure 2: Geographic spread of projects under 'Effective Teaching' theme



2 Methodology

This synthesis report began with a full scoping of the outputs published in association with the 30 RLO projects. Each grant holder disseminated published outputs on the Impact Initiative website (linked in the footnote above), as well as the UK Research and Innovation Gateway to Research website.⁴ ESRC also maintains a spreadsheet of all reported outputs categorised by project/grant.⁵ To locate actual copies of these outputs, searches were made across academic databases, Google, and conference websites (to find specific abstracts or presentations). In total, searches resulted in the location of 134 actual copies of published outputs across the three calls. Researchers then created an Excel spreadsheet categorising each of these outputs by both call and associated project to better identify common themes and connections. Methodologies and summaries of each output were added to the excel sheet to serve as a robust database of RLO outputs.

A challenge in the initial phases of data synthesis for this report came in the form of locating accessible copies of all the listed outputs for RLO projects. Every author self-reports outputs to ESRC (see footnote below), and the databases and websites only keep track of citation information and do not link to actual copies of the documents themselves. Thus, more than 30 self-reported outputs were not located with initial search methods. Of these, the vast majority were classified as conference papers, presentations or abstracts. Due to the nature of these outputs, most or all of them simply may not have been digitally archived in any form, as there was no expectation that these types of outputs would have a digital presence. Nearly all of the remaining unlocated resources were categorised as books or book chapters. For these, researchers emailed the individual authors directly to obtain assistance in tracking down soft copies. For the books and book chapters listed, three of the five contacted authors responded by providing copies of materials, resulting in five additional outputs for a final total of 139. Consequently, this challenge should not be considered a gap in this synthesis report as the authors utilised all available data at the time of writing.

The acquired sources had a broad range of output types, lengths, and depth of research explored. Therefore, each document was carefully evaluated for quality, relevancy and redundancy before making the final list of outputs for each synthesis. In the 'Effective Teaching' call, 67 of the original 80 documents are highlighted in this report. For more information regarding each of the utilised sources, to include a brief overview of their methodologies, the contexts covered, and type of document, refer to Appendix B. To better see how these outputs aligned with the different RLO projects highlighted in Figure 1, refer to Appendix A for a breakdown of project titles, contexts, intended objectives, and the number of outputs that this report utilised for each project.

The final list of outputs for the 'Effective Teaching' call was synthesised using a narrative synthesis approach along thematic lines. Though each individual project focuses on a specific context or theme, which allowed for natural categorization, further analysis highlighted more interconnected categories, and three major sub-themes emerged around effective teaching. These three sub-themes provide the structure for Section 3, including advances in tools, measurement, and methodologies for teaching and learning quality; developing a better understanding of who

⁴ <https://gtr.ukri.org>

⁵ It is important to note that the library of outputs available for these synthesis papers was limited to what was available at the time of writing (January to March 2022). In a dissemination workshop held with grant holders at the end of the revision process (May 2022), grant holders noted that there were outputs published that were not included amongst the materials reviewed in the three papers. This is because the Gateway to Research site, which collates grant holder submissions via ResearchFish, would not be updated to show the latest round of ResearchFish submissions until after the writing and feedback period, meaning that much of what was submitted in 2021-2022 is not reflected in these three papers.

teaches, where they study, and the contexts they teach within; and an exploration of the interventions that address multiple forms of disadvantage. Other background documents and pertinent literature have been included in this synthesis to provide context and additional information surrounding these categories. After utilising similar methods for the other two synthesis reports in this series, final analysis consisted of discovering cross-cutting themes across all of the RLO programme's outputs (see synthesis reports on 'Challenging Contexts' and 'Accountability' as well as notes in this report for more detail).

3 Key findings on Effective Teaching from the RLO work

RLO research funded under the 'Effective Teaching' theme has generated high quality and innovative evidence spanning several contexts and filling critical evidence gaps in the global evidence base. The sub-sections below summarise this evidence in terms of innovations in the use of tools and specific methodologies to examine teaching effectiveness; interventions advancing pedagogy; teaching children facing disadvantage due to factors such as poverty and gender, crises/conflict-affected contexts and disability; and evidence pertaining to system-wide factors that influences teachers and their teaching practices. It is important to note that all topics in this synthesis report are concerned specifically with how they impact teaching effectiveness. For more analysis about cross-cutting themes, especially those in Section 3.3, please refer to the synthesis reports on 'Challenging Contexts' and 'Accountability'.

3.1 Advances in tools, measurement techniques and methodologies for teaching and learning quality through RLO-funded research

3.1.1 Measuring and observing teaching quality

RLO-funded research under Call 1 has especially advanced understanding of the tools, measurement techniques and methodologies adopted for teaching and learning quality across different challenging contexts. Aslam *et al.* (2019b) seeks to make the unusual contribution to the literature by providing a detailed account of the reasoning behind and practical difficulties encountered when trying to research the impact of teaching quality on student learning in India and Pakistan. The paper recognises that there is a large body of evidence (mainly from the US) suggesting a number of strong research designs that model the impact of teaching on pupil achievement; however, operationalising these models in more resource-constrained contexts can be immensely challenging. The paper contributes a detailed and frank account of developing a workable research design through describing the authors' attempts to model the impact of teachers and their practices on pupil achievement using household/school surveys, teacher surveys and efforts to assess teacher knowledge. This work is an important contribution to the literature base as it provides a summary of existing techniques that have been used globally and their advantages and disadvantages within two low/middle-income country contexts. In particular, the paper delves into classroom observation approaches for measuring teaching quality, student learning (and the challenges therein), teacher characteristics and behaviours, and teacher knowledge. Most critically, it engages with the contextual factors that need to be considered when choosing a methodological approach.

As demonstrated in that work, one area of research focus that has grown exponentially is observing teachers within their classrooms to unpack what happens there and make linkages to student learning and other outcomes in order to provide evidence on teaching quality. There has been a body of evidence on the use of classroom observations in the US, including a renowned largescale study, 'Measures of Effective Teaching' (Kane & Staiger, 2012), which found that by observing teachers within their classrooms and using a variety of observation rubrics, it is possible to estimate differential teacher effectiveness. The project compared five different approaches to classroom observations and found that combining teacher observation with teachers' self-reported data and student outcomes, rather than using observation or test score measures alone, may be the best means of identifying high-quality teaching. However, there have been several limitations to the use of classroom observation data, including low levels of inter-rater reliability, an issue that necessitates observations being carried out by multiple assessors in order to reduce biased results (Darling-Hammond, 2012; Kane & Staiger, 2012). Another key issue is that in low and lower-middle income countries, classroom observation is a fairly new phenomenon. Additionally, the sheer scale

of data collection means that smaller and less well-funded projects may not collect 'linked' data: essentially, whilst they may collect information on teachers, they may lack data on student test scores⁶ or vice versa. RLO-funded research has attempted to overcome these limitations by testing and applying tools in low and lower-middle income country settings.

A strong example of classroom observation tool development emerged from the RLO-funded project 'Toward the development of a rigorous and practical classroom observation tool: the Uganda secondary school project'. The research within that project has produced useful insights into how the development and application of a contextualised classroom observation tool can be used for teacher feedback, reflective practice and continuous improvement. Kim *et al.*'s (2019) study in Uganda, India and Ghana focuses on the need to develop teachers' skills and reconceptualize their training and evaluation towards implementation of 21st century skills. These skills encompass a range of competencies, including critical thinking, problem solving, creativity, meta-cognition, communication, digital and technological literacy, civic responsibility, and global awareness (Dede, 2010). Kim *et al.* (2019) suggest that a key deliverable of classroom observation instruments is feedback on teachers' performance which allows for continuous improvement and ongoing support through feedback, which is supported in the international literature (see Butler & Winne, 1995; Allen *et al.*, 2011; Becker *et al.*, 2013; Cappella *et al.*, 2012; Glisson *et al.*, 2006; Smith & Akiva, 2008). Mentoring and reflective practices are suggested as powerful mediums to encourage ongoing improvement of teachers. One classroom observation tool used within the research is the Teacher Instructional Practices and Processes System (TIPPS; Seidman *et al.*, 2013), which is designed specifically for low- and middle-income country (LMIC) contexts and provides a granular, nuanced and culturally relevant manner approach to teaching; Kim *et al.* (2019) viewed it as a reliable and valid classroom observation tool which represents a critical innovation for research in low and lower-middle income contexts.

In an additional branch of the project in Uganda (Seidman, 2018; Seidman *et al.*, 2018), the TIPPS observation tool was used again in collaboration with the Ugandan Education Ministry and the World Bank to collect classroom data in 197 Ugandan secondary schools. The subsequent observation data was matched with 8th grade achievement data in English, Mathematics and Biology across 18 behaviour dimensions. From that analysis, researchers identified three critical dimensions of teaching quality:

- 'Instructional Strategies' which includes student-centred learning such as the encouragement of student questions and ideas;
- 'Sensitive and Connected Teaching' which refers to a teacher's ability to connect lessons to everyday life and sensitiveness to respond to students' needs; and
- 'Deeper Learning' which focuses on a teacher's ability to break down concepts to help facilitate student learning.

Seidman *et al.* (2018) suggest that these findings are critical not only because they provide crucial insights into 'what works' within the Ugandan context but they also present a blueprint for using TIPPS to improve teaching quality and student performance in low-income country contexts. Additionally, in another report from this project located within the Ghanaian context (Wolf *et al.*, 2018), the application of TIPPS in pre-primary settings found evidence that use of the tool supported three key domains: it could facilitate deeper learning, support student expression, and facilitate emotional support and behaviour management. Most importantly, the findings from this context suggest that the material and psychological resources available to teachers influence the nature of interactions they have with their students within their classrooms, in that teachers who had received training in early childhood development were more likely to implement classroom management techniques that were developmentally appropriate for the children they were

⁶ There are a few exceptions to this such as data collected from the Young Lives project (see <https://www.younglives.org.uk/>) as well as some small-scale datasets from Pakistan and India.

teaching. In sum, the three critical teacher elements that matter for teacher learning are teacher schooling level, training in early childhood development and professional well-being.

Box 1 takes a step back from teacher observation to consider one of the key elements necessary for effective observations alongside the tool being used: how to prepare the enumerator conducting the observation itself.

Box 1: Supporting enumerator competencies

Data collection in emergency conflicts is a particular challenge for researchers. Given the ever-changing nature of those contexts, and the limited options available for triangulating and verifying data, it is particularly important that any material collected for research is accurate, robust, and high-quality. One RLO project was set in Niger, a country experiencing 'spill-over conflict from Mali and Nigeria, with a recent history of ongoing crisis. The study by Brown and Ngoga (2019) introduces a field-feasible method for ensuring data quality through improving the core competencies of enumerators who collect the data in the field. The authors specifically highlight how supervisors conducted field monitoring of enumerators to determine these competencies during the '3EA Education in Emergencies, Evidence for Action' study. Evidence from the trialling of this approach and the incorporation of evidence-based competencies provides researchers with important tools for enumerator selection and their training, and for monitoring and building supervisor capacity, which represents a key contribution to the growing field of Education in Emergencies.

3.1.2 Assessing student and teacher knowledge

RLO-funded research under 'Effective Teaching' has also produced evidence on the use of tools for assessing approaches to learning, tools measuring students' reasoning abilities and those for measuring teachers' epistemic knowledge (understanding how students learn) rather than content knowledge (subject matter expertise) alone. Measurement of student approaches to learning has attracted debate due to its complex nature and the frequent reliance on standardised quantitative measures. Whilst results from questionnaires may indicate high levels of reliability within contexts, whether these measures can be reliably transferred to other contexts had remained open for debate. The findings of Rolleston *et al.* (2019) from an RLO study in Ghana, Kenya and Botswana suggest that the revised two-factor Study Process Questionnaire (R-SPQ2F), which is a version of one of the most commonly used assessments of approaches to learning, is appropriate for those three African country contexts. With this evidence that these instruments are applicable in the selected African settings, they represent an important tool for enhancing research in LMICs as they are simple to administer, and their responses are straightforward to process. Another RLO study by Abate *et al.* (2020) also validates the use of another instrument aimed at measuring students' reasoning abilities in a low-income context – in that case, for Ethiopia.

Shifting to another RLO project, Ford *et al.* (2019) provide evidence on the use of a tablet-based assessment tool to measure children's executive function skills regardless of literacy levels. This study is important not only because it is one of the very few studies that brings computerised testing out of laboratories and into the field of humanitarian settings, but also it was conducted in Niger, a low-income context that is also a conflict-affected state. The authors find that they can successfully measure working memory and inhibitory controls with a range of student populations and therefore provide exciting opportunities for further research.

Finally, Tarekegn *et al.*'s (2020) RLO study in Ethiopia has examined the development and validation of a test of in-service teachers' epistemic knowledge of physics content in an African context. The authors note that most existing test instruments have tended to emphasise the assessment of teachers' *content* knowledge and, in doing so, have failed to measure the epistemic aspects of science. These findings add to the small body of studies in science education where the nature of teachers' epistemic knowledge is conceptualised, and its features are identified.

3.1.3 Gauging progress in access to education and equity at the national level

Other RLO research has focused on critical themes pertaining to measurement of educational outcomes at the more macro level. Rose (2015) concludes that the global frameworks for measuring outcomes agreed in Jomtien in 1990 and Dakar in 2000 have strengthened over time in terms of their clarity, measurability and equity. Most notably, she notes that developments in the use of data to track the progress of all children and for disadvantaged groups in particular have been a key aspect in setting targets, measuring progress and in holding governments and donors to account. RLO research has also shown that donor accountability has increased due to the use of high-quality data and trackers, as with Zuberi and Rose (2018), who use the donor scorecard to assess inequalities in donor funding in childhood development.

However, at the country level, studies in the RLO project 'Learning outcomes and teacher effectiveness for children facing multiple disadvantages, including those with disabilities: India and Pakistan' find different results in terms of accountability and national progress. According to Alcott *et al.* (2018), although national education plans may implicitly measure equity by ensuring minimum standards are reached, most often they do not include indicators for learning and, in the few that do, the main dimension of inequality included is sex. The authors suggest that closing learning gaps between disadvantaged groups and the rest of the population can only be achieved if progress is tracked separately for different sub-groups or tracked by assessing parity between sub-groups through more appropriate and impartial indicators. They suggest the need to measure equity and learning at all education levels for the whole school-aged population (in and out of school) and starting from early grades to ensure not only that minimum standards are met but also that equity gaps are narrowed. Another study in this project by Rose *et al.* (2017) suggests that measuring averages alone, for example in primary school completion rates, can mask large and persistent inequalities. Those hidden inequalities are primarily driven by gaps in access and learning between children from rich and poor households, by gender and by location. For example, the authors find that LMICs with rates of primary completion higher than 50% have almost no gender gap, while girls in countries with primary completion rates less than 50% tend to be at a disadvantage. This study makes an important contribution by noting the need for education data and analysis to be more disaggregated, specifically across some of the RLO programme's cross-cutting themes of gender and access.

The choice of indicator used to measure progress has also been shown to be critical. For example, RLO research on the measurement of out-of-school children has shown that inconsistencies in measurement can have major policy implications. The study by De *et al.* (2016) has examined these differences using the example of India and discusses ways in which data quality can be improved. For the Indian context, this research suggests several improvements:

- Given differences in school structure and age of admission across states, estimates based on the national level should be revised to match state schooling rules by making estimates at the state level;
- Definitions of out-of-school children should also be revisited and based on regularity of attendance; and

- Data on reasons behind extended absence from school also need to be collected to make more targeted and effective policies and interventions to address the needs of out-of-school children.

3.2 Who teaches you, where you study and who you are

3.2.1 Teachers as the focus of numerous policy and programme initiatives

Teachers are the vital points of interaction between education systems and key stakeholders. Therefore, they have rightly been the focus of numerous policy and programme initiatives. Research has noted that policies aimed at improving teaching effectiveness, and ultimately student learning, need to adopt a holistic approach addressing issues pertaining to each stage of a teacher's career. This process begins by ensuring that the teaching profession attracts a high cadre of individuals and is further able to retain them within the profession as they progress through their careers. These policies also need to support those teachers who are already deployed in the system to achieve their potential through professional development and motivational structures, incentives and accountability mechanisms that elicit high teacher effort whilst at the same time recognising the barriers they face in educational delivery (Aslam & Rawal, 2015). In order to achieve widespread gains, largescale interventions have been implemented across a range of initiatives globally to improve teacher effectiveness.

One of the first steps to ensuring an effective teaching force requires attracting the best and most motivated candidates into the profession. It is not enough to attract a sufficient quantity of individuals into the teaching cadre; there is also a need to ensure that teachers are sufficiently knowledgeable and secure in the content of the subject they will be teaching. In an ideal scenario, teachers should enter the profession with the relevant competencies and knowledge to teach their subjects, but this is often not the case. In such instances, training programmes of adequate length and of sufficient quality offer one policy solution. Resource-constrained governments are seeking solutions to resolve these issues, such as through the use of contract teachers or paraprofessionals being hired from within communities in order to resolve teacher shortage problems. An alternative approach that has been increasingly used takes the form of partnering with a private or non-state provider in the delivery of education services.

Several RLO research projects explored these relationships between public and or non-state private providers. One particular research project (Murphy-Graham *et al.*, 2020), titled 'Examining effective teaching in rural Honduran secondary schools', delved into the innovative features of a schooling system that uses recruitment and professional development as well as the on-going support of teachers to address some of the underlying challenges for improving school quality. Based in rural Honduras, this project explored the elements that support effective teaching in poor, rural/remote, geographically isolated communities. Employing a case study methodology, this research examined two 'nested' cases of secondary schools in rural Honduras – the Sistema de Aprendizaje Tutorial (SAT) programme, which is a partnership between government and local non-government organisations, and the more traditional Centros de Educación Básicos (CEB). The model focused on quality teacher training, flexible teacher contracts and non-traditional recruitment methods in a context struggling with recruiting enough teachers in rural areas, and SAT used flexible and locally driven approaches to recruit teachers, such as through radio announcements. There, potential candidates were screened by the local governments, and those who met the role requirements were called into training. Newly recruited teachers were provided with two weeks of in-service training courses at the beginning of each trimester (for a total of 250 hours of training during the year). This training focused on the curriculum they were meant to teach, an approach which enhanced teachers' content knowledge. Teachers in this programme also received ongoing

monitoring and support through bi-weekly observation by a coach; tests were also administered to pupils each trimester, which created suitable accountability for the teachers in this environment. Using this model resulted in more local individuals being hired as teachers, which reduced absenteeism and increased retention. This research has shown how innovative schooling models can inform the design of education systems to improve teacher effectiveness at scale (Murphy-Graham, 2018; McEwan *et al.*, 2015).

In the same vein, another RLO project (Aslam, Rawal, Kingdon, *et al.*, 2016) involved a systematic review of teacher effectiveness reforms at scale; the project included engagement with how they have improved teaching quality and the barriers they have overcome in the process. The review for 'Learning outcomes and teacher effectiveness for children facing multiple disadvantages, including those with disabilities: India and Pakistan' encompassed a wide range of interventions including contract teacher schemes, teacher training and education schemes, teacher community assistant programmes and improved teacher monitoring systems. This review found that 'what works' is context-specific and determined by the characteristics of the intervention and its implementation. This finding has been reiterated by Kerwin and Thornton's (2021) RLO research for the project titled 'The Literacy Laboratory Project (LLP) under the Northern Uganda Literacy Program'. In that programme, researchers found that the effectiveness of the programmes is highly sensitive to small changes in inputs as well as to the specific outcomes that are chosen for measuring effectiveness as shown by their assessment of the LLP in Northern Uganda. For example, when small changes were made to a literacy programme (i.e., utilising a 'train the trainers' approach versus more direct support to teachers), students' reading and writing scores fell significantly.

Education systems are influenced not only by the larger macro governance environment but also by the motivations and actions of key stakeholders within and outside the education system. Of these stakeholders, teachers have not only been shown to be the most critical input into a child's educational experience, but they also are, typically, the best organised and most vocal amongst stakeholder groups, potentially giving them the capability and power to influence the political economy of education systems. As mentioned earlier, recognising the importance of the education workforce has resulted in a vast array of reforms that focus on teachers and teaching. Resultantly, teacher politics has also been the focus of RLO research efforts which recognise that positively engaging with teachers at the design and implementation stages of a reforms process is likely to result in beneficial outcomes (Aslam, Rawal, Asadullah, *et al.*, 2016). Analysis of primary and secondary data in this study in India, Pakistan and Bangladesh has indicated that teachers are relatively well paid, politically active and organised and able to influence key education agenda items. However, the burden of ad hoc administrative and non-teaching duties has placed arduous pressure on teachers and has often resulted in discontent, to the detriment of student learning. Therefore, improving teaching effectiveness through changes in recruitment policies, deployment, transfers, monitoring and accountability have been identified as essential, though there is a lack of evidence to show teachers being positively engaged during the design and implementation process of system level reforms. During the pandemic, teachers' roles have expanded from purely academic to providing wider well-being and health related support, as noted by a recent study on teachers and teaching based on an evaluation of the Girls Education Challenge Phase II conducted in Afghanistan, Ghana and Sierra Leone (Rose *et al.*, 2021). This report indicated the importance of female community-based educators for ensuring the continuing education of girls whilst schools were closed, as well as their safe return to school once they reopened. This approach required adapting teacher training, content and delivery to support the changing needs of learners.

Aslam (2016) also discusses the feasibility of imposing national minimum wage legislation for teachers working in the low-fee private school sector in Pakistan. This RLO study questions how broad-based legislation can be imposed especially within a sector where the scale is not fully

known and where the majority of the schools function in an unregistered and unrecognised environment. The consequences of blanket legislation mean that the impact on small-scale enterprises may result in large-scale closure or even the unintended consequence of furthering illegality or corruption when faced with the prospect of meeting a government mandate that cannot be fulfilled. Overall, the evidence suggests that education systems are complex and require careful consideration of multiple factors for policies to be effective in achieving the goals they set out.

3.2.2 Teacher capacity development

Initial and ongoing teacher professional development can not only improve teachers' competence but can help with motivation and support, particularly when teachers are working in challenging and adverse environments. In addition to this, training can assist teachers in supporting a diverse range of learners to better meet their needs (Varkey Foundation, 2020). Pre- and in-service teacher training has been the subject of research under the RLO-funded programmes across different contexts. A study by Alemu *et al.* (2021) has focused on the knowledge gaps between the intended and attained curriculum of Ethiopian teacher education; the authors identify serious gaps between the intended, delivered and the attained curricula related to physics teachers' knowledge. They suggest that such gaps are detrimental to student learning and call for reconsideration of the country's teacher education curriculum to ensure that teachers are equipped with the knowledge and efficacy to deliver high student learning. Exposure to both pre-service and professional development training was seen to improve skills in handling teacher dialogue with students in classrooms in Ethiopia and encouraged teachers to adopt more learner-centric methods of teaching (Kind, 2018). Those students whose teachers had received the pedagogic training intervention performed better in terms of length and depth of responses in an assessment; they also demonstrated better reasoning. There is also further evidence from RLO research in Ethiopia to suggest that use of an interactive classroom during in-service training can improve teacher trainees' understanding of the curriculum (Worku & Alemu, 2020).

Critical thinking has been cited as the most important outcome of a modern university education. However, employers globally often decry a lack of these skills amongst the graduates who come into their employment. The 'Pedagogies for Critical Thinking' (PCT) project, funded by the RLO under the 'Effective Teaching' theme, investigates this issue in 14 universities in Botswana, Ghana and Kenya; of that group, eight institutions are employing 'innovation' in their pedagogical approach. Research pieces from this project have found that student gains in critical thinking varied by institution and a mere introduction of learner-centred teaching methods was not sufficient for encouraging the development of critical thinking skills. The researchers suggest that institutions must foster a common understanding of teaching in order to support the development of critical thinking skills; they must also grant teaching staff sufficient time to discuss and improve their practice in order to foster pedagogical change, and structure the curriculum and content of final examinations appropriately (Schendel *et al.*, 2019; Schendel & Rolleston, 2019; Pon & Schendel, 2020; Schendel *et al.*, 2020).

3.3 Multiple forms of disadvantage and the interventions that address them

Children often face multiple forms of disadvantage stemming from their personal and household characteristics as well as through the context within which they live. Whilst gender is a cross-cutting theme across all sections, this sub-section specifically looks at various forms of disadvantage and examines intersectionality and the compounded effect that it can have on children's education access and learning outcomes. It also focuses on some of the interventions

that have been implemented to address these intersecting forms of marginalisation under RLO-funded projects.

3.3.1 Poverty and gender

Evidence from India and Pakistan under the RLO umbrella has shown that poverty and gender influence whether a child goes to school at all, and, if they do, what type of school they attend (Alcott & Rose, 2015). This research also shows that children from more disadvantaged backgrounds display lower levels of learning regardless of the type of school they attend – whether it is government-funded or private. The study also finds that wealth gaps can be further reinforced by gender. For example, when parents are forced to choose between which child's education they will fund, they are more likely to pay for their son's education than their daughter's.

Gender has also been identified as a marker of disadvantage from other contexts, as evidenced by RLO research conducted in rural Honduras examining girls' enrolment and drop out and how these factors relate to child marriage and adolescent pregnancy (Murphy-Graham *et al.*, 2020). Efforts in school to address adolescent pregnancy and early child marriage can help target the deep-seated social norms that hinder girls' access to education. This approach can be achieved through school- and community-based interventions that focus on changing knowledge, behaviour and attitudes towards gender, equity and power (Achyut *et al.*, 2016).

Additionally, using a large household data set, Alcott and Rose (2017) also find that even after controlling for all other sources of differences in learning, the magnitude of wealth remains the strongest predictor of learning gaps, particularly over the primary school cycle. The study also finds that gender gaps increase across the school grades and primarily amongst the poorest households, suggesting the need to provide targeted opportunities to girls in areas and households where the differences are the most prevalent.

In an RLO study in India and Pakistan, Aslam *et al.* (2019a) also find that irrespective of starting levels of achievement, children from poorer households make less progress than their richer counterparts. The study also found that both school and teacher effects are highly significant, indicating that not only does the pupil's school matter but their academic progress is also severely impacted by which teacher they are taught by. One reason behind this finding that has been posited in previous research is the role that social distance plays between the teacher and the taught, which contributes to inequalities in education outcomes (Rawal & Kingdon, 2010). RLO research by De and Malik (2021) in India and Pakistan also reiterates the negative influence on educational outcomes that results from teachers' negative perceptions of children from poor families and those with illiterate parents when there is a social distance between the teachers and the students they teach. Systemic barriers have been identified as hindering children's access to education even where governments have enacted large-scale legislation through the commitment to no-cost and barrier-free schooling for all children, such as in India. In this context, as per RLO research by Srivastava and Noronha (2016), despite India's Right of Children to Free and Compulsory Education Act (2009), there are disconcerting findings regarding access to private schools even with the government's commitment to create further participation in the private school sector for all children. The study noted that government provision remained the main source of schooling for poor households and successfully securing a 'free' private school seat appeared to be linked to high levels of motivation and persistence, better relative social positioning and advantageous social networks, with poorer households mainly accessing lesser expensive private schools due to household's experiencing 'soft barriers' to this type of education.

3.3.2 Crisis- and conflict-affected contexts

It is critically important to improve children's learning and development in conflict-affected countries to break the intergenerational transmission of violence and poverty. However, the evidence base on which interventions work to improve learning in such contexts is limited. RLO-funded research from 'Promoting children's learning outcomes in conflict-affected countries: generating, communicating, and incorporating evidence for impact' attempts to address this critical knowledge gap.

Several high-quality outputs from this project examine the impact of the 'Learning in a Healing Classroom' (LHC) intervention in DR Congo (Aber *et al.*, 2015; Aber, Torrente, *et al.*, 2017; Torrente *et al.*, 2019; Aber, Tubbs, *et al.*, 2017). This school-based intervention was designed to support children's socio-emotional well-being and academic learning and consisted of two components: teacher resource materials that infuse socio-emotional learning (SEL) principles into a reading curriculum and collaborative school-based teacher learning circles to exchange information and solve problems using those resource materials. Whilst the results show mixed evidence across different outcomes and cohorts, the findings suggest that approaches that integrate academic and social support may be a viable option to improve students' academic outcomes in DR Congo and potentially in other countries affected by armed conflict (Aber *et al.*, 2015; Aber, Torrente, *et al.*, 2017; Torrente *et al.*, 2019; Aber, Tubbs, *et al.*, 2017). Specifically, Aber *et al.* (2015) provide clear and statistically significant evidence that the LHC approach improves children's reading skills, domains of maths, and perceptions of their schools as caring and supportive during the first year of implementation; however, it does not reduce children's mental health problems or experiences of peer victimization. In later RLO work by Aber, Torrente *et al.* (2017), these findings are reiterated by results that indicate marginally significant positive impacts on children's reading and geometry scores but not on their addition/subtraction scores. Conversely, Torrente *et al.* (2019) find more significant improvements in maths (addition and subtraction) as well as in teachers' sense of accomplishment.

Looking holistically at education, Aber, Tubbs *et al.* (2017) provide evidence that improving school ecologies and their supportiveness and caring environments could potentially be an effective target for school-based efforts. In their study, the authors found that schools that were perceived as more 'caring and supportive' in turn had better school geometry and addition/subtraction scores, less school victimization and fewer mental health problems, providing causal evidence that perceptions of school ecologies are amenable to interventions and those interventions can in turn improve children's development in conflict-affected countries. Another piece of research emerging from this project in DR Congo notes that the relationship between exposure to community violence and socio-emotional well-being can be improved by immersion in a cooperative and predictable school climate (Starkey, 2016). The research found that exposure to community violence was associated with more mental health problems and peer victimization, whilst safe, supportive, cooperative, predictable, and teacher-rated safe schools were associated with fewer mental health problems and less peer victimization, a finding consistent with previous research.

The project titled 'Promoting children's learning outcomes in conflict-affected countries: evidence for action in Niger' also provided evidence on the education of children residing in another conflict-affected setting. Aber *et al.* (2021) reviews the opportunities and challenges in designing and conducting research on the learning of children who reside in such settings. The paper aimed to look at 'what works' in enhancing children's learning, for whom and under what conditions; it concludes by highlighting several essential features of a global development science for action.⁷ Further, several high-quality papers under this project have examined the impact of the 'Healing Classroom' programme, which provides tutoring, SEL programming, and additional activities to

⁷ See paper to read more about each of these features.

support well-being, such as mindfulness training. Brown *et al.* (2018) showed that access to the Healing Classroom's remedial tutoring programme significantly improved literacy and mathematics skills for locally and internally displaced Nigerian and refugee Nigerian students; results echoed by Aber *et al.* (2019), who also found that students who attended public schools and received the tutoring programme demonstrated literacy gains. Further, the addition of targeted SEL programming and mindfulness activities in particular improved children's socio-emotional outcomes, especially for girls who reported feelings of sadness or aggression and heightened stress levels.

3.3.3 Children with disabilities

Children with disabilities (CWD) continue to be one of the most excluded groups when it comes to education. Despite the education of children with disabilities now being an area of international focus through Sustainable Development Goal (SDG) 4 and the Incheon Declaration, more than 93 million children across the globe have some disability. According to UNESCO estimates, at least 90% of those who reside in countries with high poverty levels do not attend any school, with fewer girls with disabilities attending school as compared to their male counterparts.⁸ RLO funding has been instrumental in advancing high-quality research on CWD and their education in LMIC contexts. Research from RLO-funded projects has focused on several strands related to children with disabilities, with evidence available on policies and programmes that have centred their goals on meeting the needs of CWD, on the challenges and barriers that have been faced in making those goals a reality, and on the innovative approaches that have been shown to work in some of the most difficult environments.

A key RLO-funded project that has resulted in several contributions to the research base in this area is one that focused on the education of CWD in India and Pakistan: 'PROJECT: TEACH - Learning outcomes and teacher effectiveness for children facing multiple disadvantages, including those with disabilities: India and Pakistan'. From that project, Singal (2016a) identifies three main issues that emerge within that context:

- There remain persistent challenges with access and quality in ensuring that the learning outcomes of CWD remain in the forefront and that teacher training and support to teachers is approached systemically;
- Whilst rights remain integral, resources and research are too, and so stakeholders need to ensure that budgetary allocations and investments in the education of CWD reflect those priorities; and
- A lack of data persists, with rigorous evidence needed to evaluate the impact of programmes and policies in the field of education and disability.

Additionally, based on their work in India and South Africa, Singal and Muthukrishma (2016) propose a more nuanced understanding of inclusive education in Southern contexts that would take into consideration the diversity and complexity of local contexts, not only in terms of where the policies are being enacted but also in terms of engaging with critical actors within the education system and understanding their actions and incentives. In particular, the authors call for understanding of how 'teachers assert their agency and enact policy in different ways, with many unintended consequences' (p. 212), acknowledging that teachers work in highly challenging environments and may have different levels of capability, agency and support. Their paper concludes that sustainable implementation of inclusive education is a 'culmination of multiple players acting in collaboration within schools and within their communities' (p. 213).

⁸ <https://allchildrenreading.org/children-with-disabilities/#:~:text=UNESCO%20estimates%20more%20than%2093%20million%20children%20globally,systems%20often%20do%20not%20accommodate%20these%20children%E2%80%99s%20needs.>

Another significant contribution of RLO research within this theme has been in improving the instruments and approaches for measurement of disability. In LMICs, Trani *et al.* (2015) identified the lack of comprehensive and cross-culturally validated tools that can identify those individuals who face activity limitations and functioning disabilities. As a result, disability estimates in those contexts often vary widely and are broadly inconsistent. In evaluating a tool, the authors have suggested how it can be used alongside other estimates to arrive at a more reliable and consistent measure of disability to facilitate more effective programming and policies. Data collected from India and Pakistan under the RLO TEACH programme (Bari *et al.*, 2018) reiterates this challenge by finding that previous estimates of disability prevalence have been lower than those found through more rigorous means. Bari and colleagues demonstrate that at least 1 in 10 children are found to be experiencing difficulties that have a significant impact on aspects of their daily functioning, a finding that contrasts significantly with previous surveys that suggest prevalence rates for disability ranging from 1-2%. A key message emerging from this research is that approaches need to identify children with different types and severity of disability to meaningfully understand and address the challenges that they face. Another key message is to understand and consider the disadvantages that arise from the intersectionality of poverty, gender, location and other factors.

The TEACH project has also resulted in a number of high-quality evidence pieces that have examined various dimensions of the education of CWD. Malik *et al.* (2020), using data from rural Punjab, find that parents are willing, where they can, to pay for their children's education (with a gender preference) whether or not they have a disability. Further, contrary to what is commonly perceived, a large proportion of CWD attend mainstream schools. This finding was reiterated by Singal (2016b), who notes the important role of mothers in particular for being a mechanism for economic mobility through the value they place on their children's education.

However, RLO research also demonstrates challenges for learning outcomes for children with disabilities. Malik *et al.* (2020) also demonstrate that the disability learning gap persists even when other factors such as parental background, socio-economic status and type of school are taken into consideration. Hammad and Singal (2015) suggest that any evaluations of educational outcomes need to consider socio-cultural realities and, in particular, the role of gender and the challenges faced by women with disabilities due to the interplay between underlying structure and agency in different contexts. Using Annual Status of Education Report (ASER) data, these findings have been further reiterated by Singal *et al.* (2020), who note that CWD in Pakistan are less likely to attend school, more likely to be out of school, and are more likely to have learning levels that are lower than their peers who are not identified as having disabilities. This paper highlights also the need to not only promote the inclusion of CWD into schools but to also focus on the quality of their educational experiences. Taneja-Johansson *et al.* (2021) specifically focuses on the role teachers play in rural Indian government schools when teaching CWD. The study found teachers tended to have negative perceptions of CWD which had an impact on their learning; teachers indicated that they were constrained in their pedagogical repertoire and lacked simple strategies to support these children. This dearth of understanding and action perpetuated the exclusion of CWD and was likely to continue: with the lack of relevant professional development opportunities and support for implementing inclusion, teachers exhibited lower confidence and were unable to engage all learners, including those with disabilities.

Another RLO research project that has generated high-quality and rich evidence on the schooling of CWD is 'PROJECT: Constructing a global framework for analysis of social exclusion from and within learning systems', which covered a range of contexts: India, Afghanistan, Morocco, Tunisia and Sudan. From that project, Bakhshi *et al.* (2017) find that vulnerable children in New Delhi, and in particular those with disabilities, are less likely to start school and more likely to drop out. Researchers also indicate that parental education, socio-economic status, gender and household

size are all marginalizing factors in determining CWDs' ability to access school and so policies need to address the attitudinal, environmental and institutional barriers that persist in preventing these children from accessing all school levels. In particular, the researchers address the need to detect difficulties before the age of 6 and advocate for adapted teacher training as a cornerstone for achieving inclusion. The importance of age is reiterated by Trani *et al.* (2017), who find that in Morocco and Tunisia, children who acquire a disability before the age of 9 are less likely to attend school than those who acquire it after that age. Family deprivation and gender were also found as important factors associated with school access and learning outcomes in Afghanistan (Trani *et al.*, 2019), with stigma and traditional beliefs being highlighted as critical challenges. In Morocco and Tunisia, the relationship between disability and poverty was shown to reflect a 'double handicap' by Trani *et al.* (2015). In particular, this research also identifies gender, prejudice and stigma and discriminatory attitudes as also perpetuating the education disadvantage faced by CWD.

During conflict, emergencies and crisis situations, access to education becomes even more tenuous and children's rights to education need to be protected and their learning continually supported both in the short term as well as the long-term in order to meet their educational goals. These insecure contexts can present even greater challenges for children with disabilities to access quality education. In an RLO-funded study from the 'Constructing a global framework for analysis of social exclusion from and within learning systems' project, Bakhshi *et al.* (2018) examines the context of conflict and protracted crisis in Darfur and investigates whether CWD are less likely to learn. The research notes that there are poor learning outcomes for children in this context in general, and even more failure to protect children's learning in a conflict setting, which requires multi-level and multipronged interventions particularly to support the learning and well-being of vulnerable children, such as those with disabilities. The paper suggests that at the school level, there is a need not only to improve teachers' working conditions but to also provide training and support on how to deal with the diverse needs in the classroom to have an impact on inclusion and children's achievement. The paper also suggests engaging with school-management committees, community teacher associations, parents and the wider community for overcoming stigmatisation, discrimination and the frequent lack of expectations for CWDs' learning. Similarly, Bakhshi (2020) looks at the conflict-affected context of Afghanistan, where there is continued exclusion of children with disabilities: 65% of CWD are out of school, with girls and those with cognitive or sensory disabilities most impacted. This paper identifies a crucial need for projects that address the complex and dynamic issues of inclusion in the learning process beyond standardised tests and rigidly defined learning outcomes. It highlights the features of the Education Equity and Quality in Afghanistan and Pakistan project, a community-based approach, that promotes learning outcomes using participatory methods from System Dynamics to respond to one of the main challenges posed by SDG4.

Another critical theme that has been an area of focus for RLO-funded research has been the provision of early childhood development and education for CWD, as seen in the 'Improving curriculum and teaching methods to influence policy and increase the quality of ECDE provision for children with disabilities in Malawi' project. The early childhood stage is known to be critical, influencing future development and social integration, since the foundations are laid for brain functioning and development and lifelong learning starting from the prenatal period and into the early years.⁹ Thus, early years programmes can be a highly cost-effective investment and studies have even found that effect sizes of child-focused educational programmes in developing contexts outpace those in developed countries (Heckman, 2008; Crouch & Merseth, 2017; Rao *et al.*, 2017). In one RLO study, which is among the first to measure disability and delay amongst pre-school children in an African country (here: Malawi), Murphy *et al.* (2020) make several important

⁹ Early childhood is formally defined by the UN Committee on the Rights of the Child as occurring below the age of 8 years. Recognising that critical influences begin even before the child is born, the early childhood period can constitute the period from conception until birth as well.

contributions to the literature, including adding to the growing evidence that calls for more intensive early childhood interventions targeting young children with disabilities. The study also shows that application of the Washington Group and Malawi Development Assessment Tools is feasible and can be used to measure the prevalence of disability and development delays in pre-school children in rural parts of a low-income setting in sub-Saharan Africa. Further, it provides data which can help in the design of more inclusive policies and practices. Further evidence from this RLO-funded project provided in Soni *et al.* (2020) explores the development of a sustainable training programme to support inclusion of CWD in early childhood settings. This research suggests the need for training and support in areas such as pedagogy, caregiver skills and positive attitudes to inclusion, as well as investments in the sector particularly around developing curricula and standards and investing to recruit better qualified staff and use higher quality pedagogy. Community-based, participatory research has also been identified by the project as a methodology that can enable community members to identify key barriers to achieving inclusion and to inform how policy and programmes can be adapted to meet the needs of those with disabilities (Greenwood, 2017). Leveraging of existing community-based structures (e.g., village elders, schools and community-based committees) can be used to coordinate efforts between families, communities and education systems, which can improve attendance, reduce discrimination and improve development of CWDs (Greenwood *et al.*, 2020). Community-based childcare centres using volunteer caregivers were also identified in Malawi as promoting greater inclusive practices for young CWD in the early years setting in that context (McLinden *et al.*, 2018).

Box 2: Supporting the needs of deaf learners

Two RLO-funded projects have also specifically focused on deaf learners and their education: 'Literacy development with deaf communities using sign language, peer tuition, and learner-generated online content: sustainable educational innovation' in India and 'Peer-to-peer deaf multiliteracies: research into a sustainable approach to education of deaf children and young adults in the global South' in India, Ghana and Uganda (Ahereza *et al.*, 2016; Gillen *et al.*, 2016; Zeshan *et al.*, 2016; Zeshan, 2018; Gillen *et al.*, 2020; Papen & Tusting, 2020; Zeshan, 2020; Webster & Zeshan, 2021a; Webster & Zeshan, 2021b).¹⁰ Both projects have identified that deaf children and youth lack access to education traditionally delivered due to insufficient language access and resources available to meet their needs. Thus, the projects work to provide learning of English literacy and multimodal literacies amongst deaf children and youth in the three contexts; especially for these learners, literacy is vital to employability and participation in everyday life. An online programme 'Sign Language to English by the Deaf' uses a blend of face-to-face peer tutoring and online activities, but the key basis of the projects is engaging the deaf community: deaf peer tutors and deaf research assistants provide literacy support to deaf learners through a more authentic approach. The efficacy of this approach was evidenced through a pilot in India, where learners made significant gains in English, largely attributed to the project's participatory nature. Both projects also helped to address the resource gap of trained teachers who are fluent in sign language, particularly deaf teachers. This success has resulted in the project being rolled out in further contexts, including South-South collaboration between India, Uganda and Nepal.¹¹

¹⁰ Webster & Zeshan (2021a; 2021b) are included here at the specific request of the grant holder during the May 2022 dissemination workshop, as these outputs did not appear in output listings provided at the start of the writing process and thus, they were not reviewed as part of the analysis.

¹¹ A third grant connected to this research, 'South-South collaboration in realising the impacts of Peer-to-Peer Deaf Multiliteracies research in India, Uganda, and Nepal' did not have available outputs (at the time of writing) that were reviewed within this synthesis.

4 Policy lessons and achieving impact

- Whilst improving teaching quality is extremely important, no universal policy advice emerges from this synthesis that works across all contexts. Therefore, countries may need to develop flexible, iterative policies that can be rapidly adjusted to meet their specific needs. Policies need to carefully consider pre- and in-service training standards and implementation methods for teachers. RLO studies showed that current training offerings in Ethiopia, Kenya, Botswana and Ghana varied in quality, often leaving teachers and students without the intended outcomes/results.
- RLO-funded research has led to the development of instruments with use across a range of applications such as for classroom observations, measuring teaching effectiveness and gauging critical reasoning. The research has resulted in the development of new tools as well as the application of existing tools to Southern contexts and, in doing so, has provided a resource bank on which to base future research. A notable achievement of RLO-funded research under this theme has been in the advancement of research on the applicability and use of specific tools for measuring various aspects such as disability, students' reasoning and teaching quality. Using the promising research exploring TIPPS and R-SPQ2F as templates, future research can develop and/or apply more tools designed specifically for LMICs and emergency contexts to collect data regarding teaching and learning practices/outcomes. This approach could also apply to students with disabilities.
- The breadth of methodologies implemented in the process of conducting RLO-funded research resulted in innovations in methodology whilst also increasing the methodological evidence base for conducting research on effective teaching. The nature of the multidisciplinary teams and mixed methods approaches adopted under this umbrella have provided a more holistic evidence base on which policies and programmes can be planned and implemented.
- The importance of data quality has also been emphasized across the RLO research funded under the auspices of the 'Effective Teaching' call. Evidence has suggested the need for clear and relevant definitions and indicators, appropriate sampling methods, disaggregated data, well-developed data verification systems, and appropriate enumerator training, amongst other factors. To better promote equity across national systems, countries need to track and disaggregate data on student performance in categories going far beyond just sex.
- RLO-funded projects have led to a multitude of high-quality research studies spanning diverse contexts examining children with disabilities' access to education and learning outcomes. Given the dearth of research in this field, this area of work is a commendable and significant contribution of this funding. This research has examined not only the measurement of incidence and degree of disability (adopting the Washington Group Questionnaires more widely and questioning the use and applicability of existing tools for LMIC contexts) but it has also focused on highlighting critical interventions that can achieve impact in improving outcomes for children with disabilities. The provision of evidence in this realm has helped change the discourse on disability research in education. Specifically, it provides critical insights into under-researched areas such as the provision of education to children with disabilities in the early years as well as focusing on specific disabilities such as deaf learners.
- In addition to traditional learning outcomes, schools are now required to prepare students for the workplace but also for jobs and technologies that may as yet not exist. This has led to a focus on so-called 21st century skills – with critical thinking as one that has been determined to be of paramount importance. With the backing of RLO-funding, research has also emerged

in this forward-looking realm and has provided important evidence for future programming and policies.

- Several papers published from RLO-funded projects under the 'Effective Teaching' call have focused on conflict, emergency and crises contexts. Given the Covid-19 pandemic, the findings and recommendations of this research are even more pertinent especially because of the devastating impact on education systems globally and in general, on teachers and on the ways in which teachers are able to teach specifically. Teachers are the critical point of interaction between education systems and the communities they serve and, therefore, engaging with teachers, focusing on teaching quality and supporting teachers in fulfilling their widened roles in such contexts is more important than ever. As seen in RLO-funded research, engaging teacher groups in policy revision can ensure that there is buy-in for reforms and educational shifts, with clear application to current changes that systems are undergoing in the Covid-19 era.
- Policy should target the deep-seated social norms that contribute to multiple forms of disadvantage, whether based on poverty or gender. Policies may also need to tackle public attitudes and perceptions, as seen with the community-based initiatives highlighted in Honduras. This approach also seems to have great potential for targeting perceptions around students with disabilities.
- Evidence from this synthesis suggests that integrating SEL and academic content could lead to improved learning outcomes in crisis and conflict settings.

The wide body of evidence that constitutes research under the 'Effective Teaching' theme demonstrates the need for a shift from piecemeal and disjointed policies and programmes towards recognising that systemic change requires working at the system level with a range of stakeholders who have ownership of the learning process. Additionally, an understanding of the contextual factors that may prevent the successful execution of well-meaning interventions, and, whilst there is no single form of policy or intervention relating to effective teaching that is the 'silver bullet', there are several promising interventions that can bring about meaningful change.

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Annex A Overview of RLO Effective Teaching projects

Project title	Contexts covered	Intended objectives	Number of outputs covered in synthesis
Constructing a global framework for analysis of social exclusion from and within learning systems	Afghanistan, Sudan, India, Nepal, Morocco, and Tunisia	This research aims to fill a gap that exists between idealistic policies that define equality as a main objective of education, and assessment of progress that remains focused on isolated indicators of equity in access to structures. It seeks to work towards a theoretical and methodological framework that deciphers processes of social exclusion not just from, but also within learning systems.	7
Examining effective teaching in rural Honduran secondary schools	Honduras	This project examines questions regarding the elements that support effective teaching in poor, rural, geographically isolated communities. If properly and strategically disseminated, this research has the potential to directly influence the design and delivery of high-quality secondary education programs in Honduras and other low-income countries. Additionally, the research will benefit others attempting to measure dimensions of educational quality at the secondary level through shared scales and assessments.	1
Improving curriculum and teaching methods to influence policy and increase the quality of ECDE provision for children with disabilities in Malawi	Malawi	This research aims to address the widespread need for equitable and quality early childhood development and education services in Malawi. The research consortium expects children with disabilities and their families living both in Malawi and in similar settings to benefit directly from the interventions offered during the study and through policy and programme changes which promote their inclusion and participation in formal and informal early childhood development and education.	5
Learning outcomes and teacher effectiveness for children facing	India and Pakistan	This project aims to identify strategies to raise learning outcomes for all children, especially those facing multiple disadvantages related to disability, poverty, gender, caste, religion, or where	23

Project title	Contexts covered	Intended objectives	Number of outputs covered in synthesis
multiple disadvantages, including those with disabilities: India and Pakistan		they live. The research will identify which aspects of teaching are most important for improving all children's learning, and so inform governments on the strategies needed to support children who face multiple disadvantages.	
Literacy development with deaf communities using sign language, peer tuition, and learner-generated online content: sustainable educational innovation	India, Uganda, and Ghana	This pilot project aims to provide English-language teaching for members of the deaf community in India (including deaf young people in high poverty contexts) and draft a model of effective language-teaching interventions for them to guide policy and further innovation. The focus is improving the quality of educational outcomes for a specific community which may not derive adequate benefit from traditional interventions.	6
Pedagogies for critical thinking: innovation and outcomes in African higher education	Kenya, Ghana, and Botswana	Concern about the capacity of graduates from African universities to demonstrate 'high skills', such as critical thinking, has prompted a growing recognition of the need for pedagogical change within many African higher education institutions. This project aims to expand the existing evidence base around how pedagogical practices affect the development of critical thinking at African higher education institutions by investigating the impact of locally generated pedagogical interventions on student critical thinking ability in Kenya, Ghana and Botswana.	5
Promoting children's learning outcomes in conflict-affected countries: evidence for action in Niger	Niger	Children in conflict-affected countries experience profound constraints on their academic learning and socioemotional well-being. Children exposed to violence and poverty come to 'school' (formal or non-formal education settings) with poor executive function skills (e.g., working memory, inhibition, attention), emotional/behavioural regulation skills and social-information-processing skills. This project aims to develop both scientific and practical knowledge about how to lift these	5

Project title	Contexts covered	Intended objectives	Number of outputs covered in synthesis
		constraints on children in conflict-affected countries like Niger.	
Peer-to-peer deaf multiliteracies: research into a sustainable approach to education of deaf children and young adults in the global South	India, Uganda, Ghana, Rwanda, and Nepal	This project extends work conducted under a pilot project addressing issues of literacy education with young deaf people in the Global South. Creating, implementing and evaluating this intervention based on the peer teaching of English literacy through sign language-based tutoring and every day, real-life texts enabled the project to generate a sustainable, cost-effective, and learner-directed way to foster literacy and multiliteracies learning amongst deaf individuals. The impact of the project will constitute firstly an increase in actors' agency in their contexts, especially those from signing communities, through a range of capacity building activities, and secondly the forging of influential South-South collaborations.	3
Promoting children's learning outcomes in conflict-affected countries: generating, communicating, and incorporating evidence for impact	Democratic Republic of the Congo	This project's authors take the position that the provision of quality education can mitigate some of the most severe consequences of conflict for children - and potentially help break the intergenerational transmission of poverty and violence - through the effective provision of safe and supportive spaces that promote children's academic and socioemotional development. This research then aims to generate, communicate, and put into practice rigorous evidence as to how to promote effective teaching and improve children's academic and socioemotional learning in conflict-affected contexts.	4
The Literacy Laboratory Project (LLP) under the Northern Uganda Literacy Program	Uganda	Despite strong mother tongue education policies, due to underdeveloped orthographies and a lack of materials in many languages, implementing successful mother tongue literacy programs poses a significant challenge for African countries, including Uganda. The Literacy Laboratory Project will scale up and evaluate a pre-established literacy program, whose	1

Project title	Contexts covered	Intended objectives	Number of outputs covered in synthesis
		model delivers better-quality teacher instruction, access to relevant literacy materials and inclusive approaches to learner assessment so that reading and writing become a meaningful part of daily life in households and communities.	
Toward the development of a rigorous and practical classroom observation tool: the Uganda secondary school project	Uganda	This research capitalizes on a large-scale experimental school and classroom-based intervention program undertaken in Ugandan public secondary schools. In a second phase of this project, this project will examine the instructional practices and classroom processes with live observations using an innovative tool, known as TIPPS, before, in the middle, and at the end of the intervention year. This data provides a unique opportunity to further develop and validate an innovative, affordable, scalable, and practically useful tool for assessing teacher practices and classroom processes.	4
Transforming the pedagogy of STEM subjects	Ethiopia	This study intends to investigate how pedagogy for STEM subjects in a low income, developing nation, Ethiopia, can be transformed from using one-way lecturing and closed teacher questions to dialogical discourse and argumentation, and the effects this generates in improved student learning and attitudes.	5

Annex B Effective Teaching outputs categorized by project

Title of output	Author(s)	Date published	Contexts covered	Type of publication	Methodology
Project: Constructing a global framework for analysis of social exclusion from and within learning systems					
Assessment of progress in education for children and youth with disabilities in Afghanistan: A multilevel analysis of repeated cross-sectional surveys	Trani, J. F., Fowler, P., Bakhshi, P., & Kumar, P	2019	Afghanistan	Journal article	This project carried out two household surveys (one in 2005 and again in 2013) that followed a three-stage clustered randomized sample design. The model measured individual and community-level characteristics and collected data provided the most rigorous and representative source for gauging the well-being of children with disabilities across Afghanistan.
Development and validation of the 34-item disability screening questionnaire (DSQ-34) for use in low- and middle-income countries epidemiological and development surveys	Trani, J. F., Babulal, G. M., & Bakhshi, P.	2015	Afghanistan, Sudan, India, and Nepal	Journal article	A Disability Screening Questionnaire was designed by a group of experts in Afghanistan for a national survey. Items were selected based on major domains of activity limitations and functioning difficulties linked to an impairment. Based on the results obtained, the tool was subsequently refined and expanded, tested, and validated in Darfur, Sudan. Internal consistency was examined in the Asian context (India and Nepal).
Disability and poverty in Morocco and Tunisia: A multidimensional approach	Trani, J. F., Bakhshi, P., Myers Tlapek, S., Lopez, D., & Gall, F.	2015	Morocco and Tunisia	Journal article	Two household surveys were carried out in Morocco and Tunisia in 194 clusters, with 30 households in each cluster. The study included six indicators within the dimension of living conditions to consider a wide variety of dimensions of well-being.

Title of output	Author(s)	Date published	Contexts covered	Type of publication	Methodology
Education and disability in a conflict affected context: Are children with disabilities less likely to learn and be protected in Darfur?	Bakhshi, P., Babulal, G. M., & Trani, J. F.	2018	Sudan	Journal article	11,089 households were surveyed in rural and urban localities, nomadic settlements, and Internally Displaced Persons settlements. 10% of these households were randomly selected for interviews on disability prevalence and vulnerability of children aged 6–18 years. Face-to-face interviews were conducted with 1436 children on various aspects of access to services, nutrition, employment, livelihoods, care, love, and psychological wellbeing.
Education of children with disabilities in New Delhi: When does exclusion occur?	Bakhshi, P., Babulal, G. M., & Trani, J. F.	2017	India	Journal article	Researchers collected information from 1294 households about the disability status of all the family members. They asked about activity limitations and functioning difficulties associated with a health problem among a total of 6779 family members using a validated screening instrument, family structure, as well as questions about access and barriers to education.
La situation socioéconomique des personnes en situation de handicap au Maroc et en Tunisie: inégalités, coût et stigmatisation	Trani, J. F., Bakhshi, P., Lopez, D., Gall, F., & Brown, D.	2017	Morocco and Tunisia	Journal article	Researchers conducted two case-control surveys with the same methodology in Morocco and Tunisia. In both, a random sample of households was selected: 50 urban and 50 rural units with 30 households in each unit. For each person identified with a disability, whether moderate or severe, a person without disability of the same sex and of the same age, living in the same neighbourhood or village was identified.
Unpacking inclusion in education: Lessons	Bakhshi, P.	2020	Afghanistan	Global Education Monitoring Report	From January 2018 until December 2021, the Global Research on Inclusion and Disability team is running the Education Equity and Quality in Afghanistan and Pakistan project based on a 5-stage action plan that focuses on

Title of output	Author(s)	Date published	Contexts covered	Type of publication	Methodology
from Afghanistan for achieving SDG4.				Background Paper	building social accountability to improve quality, inclusion and equity in schools. The project proposes innovative methods, tools and a mindset that delve into assessing inclusion processes.
Project: Education systems, aspiration and learning in remote settings					
School dropout, child marriage, and early pregnancy among adolescent girls in rural Honduras	Murphy-Graham, E., Cohen, A. K., & Pacheco-Montoya, D.	2020	Honduras	Journal article	This mixed-methods longitudinal study began in 2008, when adolescents were completing sixth grade. Follow-on interviews took place when students were in seventh and eighth grades, as well as in post-secondary education. The quantitative analyses focus specifically on the 684 female youth who participated in the last survey, when participants were approximately 20 years old. 32 female participants were selected for in-depth, qualitative interviews.
Project: Improving curriculum and teaching methods to influence policy and increase the quality of ECDE provision for children with disabilities in Malawi					
Estimated prevalence of disability and developmental delay among preschool children in rural Malawi: Findings from 'Tikule Limodzi,' a cross-sectional survey	Murphy, R., Jolley, E., Lynch, P., Mankhwazi, M., Mbukwa, J., Bechange, S., Gladstone, M. J., & Schmidt, E.	2020	Malawi	Journal article	A cross-sectional survey was conducted in 48 preschool centres in Thyolo district, Malawi. Data were collected from parents or guardians of 20 children per centre. Disability was ascertained using the Washington Group/UNICEF Child Functioning Module. Child development was measured using the language and social domains of the Malawi Development Assessment Tool.

Title of output	Author(s)	Date published	Contexts covered	Type of publication	Methodology
Facilitating the participation of children with disabilities in early childhood development centres in Malawi: Developing a sustainable staff training programme	Soni, A., Lynch, P., McLinden, M., Mbukwa-Ngwira, J., Mankhwazi, M., Jolley, E., Virendrakumar, B., Bedford, J., & Gercama, I.	2020	Malawi	Journal article	This programme is based on a review of literature of curriculum, pedagogy, and teaching approaches in early childhood education in sub-Saharan Africa, alongside a review of national policy documents. Drawing on the themes identified in a review of literature, an Inclusion Resource Pack was developed to highlight disability and promote the inclusion of children with disabilities in daily activities. Researchers then interviewed parents and caregivers to gauge the effectiveness of the resource pack.
'Let's grow together': Understanding the current provision of early childhood development and education for children with disabilities in rural Malawi through community-based participatory research	Greenwood, M., Gercama, I., Lynch, P., Moore, K., Mankhwazi, M., Mbukwa, J., & Bedford, J.	2020	Malawi	Journal article	This paper uses a multi-method study undertaken in ten Community Based Childcare Centres in a rural district of Southern Malawi. Participants were recruited through a purposive sample framework and approached based on child disability reported by the centre head caregiver or a member of the management committee. Data were collected in ten centres in rural localities of the Thyolo district in Malawi, using a mapping study of the district. Additional data were gathered post analysis when community researchers reflected on the findings and the research process.

Title of output	Author(s)	Date published	Contexts covered	Type of publication	Methodology
Supporting children with disabilities in low- and middle-income countries: Promoting inclusive practice within community-based childcare centres in Malawi through a bioecological systems perspective	McLinden, M., Lynch, P., Soni, A., Artilles, A., Kholowa, F., Kamchedzera, E., Mbukwa, J., & Mankhwazi, M.	2018	Malawi	Journal article	The project explores ways of developing the skills of caregivers to support children with disabilities in Community Based Childcare Centres using inclusive strategies and resources. To achieve this, the study is training caregivers using an Inclusion Resource Pack, which is integrated into a national training manual used by nationally recognised agencies. A key output of the study is the development of a revised evidence-based curriculum for caregivers and the provision of inclusive learning materials for the Malawi Government to use as part of its early childhood development programme.
The capacity of community-based participatory research in relation to disability and the SDGs	Greenwood, M.	2017	Global	Journal article	At a practical level, community-based participatory research involves recruiting community or peer researchers, involving them in planning, and offering them training to undertake interviews and observations in their context. They are also part of the analysis and dissemination process and continue to work with local partners on advocacy plans and events after projects and research end. This paper aims to consider related literature and describe and critique the methodology and practical process, drawing on organisational-specific research with regards to the participatory approach.

Title of output	Author(s)	Date published	Contexts covered	Type of publication	Methodology
Project: Learning outcomes and teacher effectiveness for children facing multiple disadvantages, including those with disabilities: India and Pakistan					
Are children with disabilities in school and learning? Evidence from a household survey in rural Punjab, Pakistan	Malik, R., Raza, F., Rose, P., & Singal, N.	2020	Pakistan	Journal article	The analysis draws on data collected for the Teaching Effectively ALL Children (TEACH) project in rural Central Punjab, Pakistan. The data are based on a comprehensive household survey in 1050 households across 30 rural villages in 3 districts. Within households, a comprehensive household questionnaire was administered to the mother to gather information on household assets, sources of livelihood, housing materials, access to drinking water, education and employment status of members, and mothers' literacy.
Do government schools improve learning for poor students? Evidence from rural Pakistan	Aslam, M., Malik, R., Rawal, S., Rose, P., & Vignoles, A.	2019	Pakistan	Journal article	Primary data were collected from 30 villages in the Punjab province in Pakistan, with 35 households and one government primary school randomly selected in each village. At the school level, the research undertook a survey of all children in grades 3 to 5 at the beginning and towards the end of the academic year. Children were assessed in mathematics and Urdu. The final school sample consists of 1683 pupils. Rich information was also collected from children on key individual and family background variables. Lastly, detailed surveys were administered to all teachers to gather background characteristics and competency in literacy and numeracy.
Donor scorecard. Just beginning: Addressing inequality in donor funding for	Zubairi, A., & Rose, P.	2018	Global	Technical report	The analysis for this paper has considered total aid disbursements to health, nutrition and sanitation sectors for Reproductive Maternal New-born and Child Health (RMNCH) as the starting point. It adds pre-school

Title of output	Author(s)	Date published	Contexts covered	Type of publication	Methodology
Early Childhood Development					education to the areas conventionally included in RMNCH, given this is also identified as being vital for children aged under the age of five years with important benefits for their later development.
Education of children with disabilities in India and Pakistan: Critical analysis of developments in the last 15 years	Singal, N.	2016	India and Pakistan	Journal article	The article draws on analysis of official policies, various programme documents, and empirical research evidence. It concludes by reflecting on the two main foci for future work in relation to the education of children with disabilities.
Education of children with disabilities in rural Indian government schools: A long road to inclusion	Taneja-Johansson, S., Singal, N., & Samson, M.	2021	India	Journal article	The data in this article comes from a larger multi-methods project. The research draws specifically on extensive, in-depth qualitative data, collected in six rural government primary schools across three districts. Following a baseline quantitative survey across 36 schools, researchers identified schools with the highest enrolment of children with disabilities, of which, two schools per district were selected. In these schools, the researchers conducted semi-structured interviews with teachers of classes 3, 4 and 5, in the local language.
Education of women with disabilities in Pakistan: Enhanced agency, unfulfilled aspirations	Hammad, T., & Singal, N.	2015	Pakistan	Journal article	A case study approach was adopted to collect rich narratives of women with disabilities. Researchers identified 6 women aged between 20 and 33 years belonging to low socio-economic group with comparatively high levels of education living in urban areas. After establishing direct contact with the women

Title of output	Author(s)	Date published	Contexts covered	Type of publication	Methodology
					and seeking their approval, researchers conducted in-depth interviews using a life history approach.
Estimating the number of out-of-school children: Methodological problems and alternative approaches. India Case Study.	De, A., & Mehra, C.S.	2016	India	Technical report	This paper highlights data quality and contradictions in different sources of education data. More recent datasets were used to estimate the number and proportion of out-of-school children and for studying variations which arise from differences in the definitions and methodologies used by the different data sources. In the study, the number of out-of-school children was estimated using Census 2011 data.
Identifying disability in household surveys: Evidence on education access and learning for children with disabilities in Pakistan	Bari, F., Malik, R., Rose, P., & Singal, N.	2018	Pakistan	Policy paper	The Washington Group has developed three sets of questions that provide a simple, sensitive, and nuanced way of capturing disability, even in contexts where there are concerns that stigma could prevent direct reporting of disability. These questions have been adopted to identify children with disabilities in surveys in Pakistan, including as part of the citizen-led assessment (ASER) data collection and the Teaching Effectively All Children research project.
Learning in India's primary schools: How do disparities widen across grades?	Alcott, B., & Rose, P.	2017	India	Journal article	To investigate their research questions, researchers analyse data from the Annual Status of Education Reports (ASER) in rural India. ASER is an annual household survey conducted by volunteers in every rural district in India, the primary focus of which is collecting information on enrolment, literacy levels, and numeracy levels among 5–16-year-olds. ASER uses a random-sampling survey design: every district in the country is surveyed, and within each district, 20 villages from the

Title of output	Author(s)	Date published	Contexts covered	Type of publication	Methodology
					previous two years are re-surveyed and 10 more are selected at random. Within each of these 30 villages, 20 households are selected and surveyed.
Lessons from 25 years of Education for All	Rose, P.	2015	Global	Book chapter	The analysis identifies variability in the clarity and measurability of EFA goals, which was a key reason why the more narrowly defined Millennium Development Goals received greater attention over the past 15 years. It also shows that the lack of a specific target for the financing of education has resulted in insufficient resources available to achieve the set ambitions.
Measuring equity for national education planning	Alcott, B., Rose, P., Sabates, R., & Torres, R.	2018	Global	Book chapter	This research draws some lessons from countries currently implementing national education plans to measure equity in learning and in education. Of the 75 countries identified, 34 were from sub-Saharan Africa, 8 from Northern Africa and Western Asia, 9 from Latin America and the Caribbean, 9 from Central and Southern Asia, 5 from Eastern and South-Eastern Asia, 8 from Oceania, and 2 from Europe and Northern America.
Methodological lessons on measuring quality teaching in Southern contexts, with a focus on India and Pakistan	Aslam, M., Malik, R., Rawal, S., Rose, P., Vignoles, A., & Whitaker, L.	2019	India and Pakistan	Journal article	This paper measured the learning gain of children, aged 8 to 12 in 1000 households in 30 villages in each of Haryana, India, and in Punjab, Pakistan. Assessments of the children's learning in mathematics and language (Urdu and Hindi) used measures which had been used previously in the Indian and Pakistani contexts for a similar age range to those in the study. To capture information about the teaching that each child in the sample experienced, detailed teacher questionnaires were administered at baseline and end line. Researchers

Title of output	Author(s)	Date published	Contexts covered	Type of publication	Methodology
					therefore also collected qualitative data on a subset of schools to triangulate findings and present a more in-depth picture of the processes within classrooms.
Overcoming inequalities within countries to achieve global convergence in learning	Rose, P., Sabates, R., Alcott, B., & Ilie, S.	2017	Global	Background paper for the Education Commission's The Learning Generation	The purpose of the study was to identify the extent of educational inequalities globally, researchers gathered data on educational access and learning from low and lower middle-income countries. As the basis for the analysis, researchers used the World Inequality Database in Education, initially developed by the 2010 Education for All Global Monitoring Report. They updated its information using the most recent data, where feasible.
Reflexive re-storying of inclusive education: Evidence from India and South Africa	Singal, N., & Muthukrishna, N.	2016	India and South Africa	Book chapter	Data was collected using semi-structured interviews with the head teacher, focus group discussions with teachers and semi-structured interviews with support staff visiting a school in a small rural community in the state of Karnataka, India. The research in South Africa also took place in a rural area and adopted a case-study approach: different institutions which are the focus of the inclusive education strategy in South Africa, namely the Special School as Resource Centre and the Full-Service School, along with a mainstream school, were included in the project.
Reforms to increase teacher effectiveness in developing countries	Aslam, M., Rawal, S., Kingdon, G., Moon, B., Banerji, R., Das, S.,	2016	Low- and middle-income countries	Independent report	Researchers explored topic-specific bibliographic databases and websites to identify studies relevant to answering each of the three review questions on effectiveness, the relationship between interventions and outcomes, and studies on the contextual factors that may aid or hinder the efficacy of these reforms. After

Title of output	Author(s)	Date published	Contexts covered	Type of publication	Methodology
	Banerji, M., & Sharma, S. K.				application of the inclusion and exclusion criteria, researchers built a 'map' of studies to provide a descriptive overview of the types of studies on teacher-reform interventions, at scale and not at scale (n=27).
School enrolment and learning outcomes for children with disabilities: findings from a household survey in Pakistan	Singal, N., Sabates, R., Aslam, M., & Saeed, S.	2020	Pakistan	Journal article	The ASER survey conducted in 2015 covered 142 rural districts, with a national sample size of 83,755 households. In addition to the standard questions, the 2015 survey also included questions specifically aimed at identifying the incidence of disability and the schooling status and learning outcomes of children with disabilities. However, this information was only collected in the province of Punjab. This paper draws on data collected on 36,076 children aged 5 to 16 years living in 14,573 rural households in the Punjab province of the country.
Schooling children with disabilities: Parental perceptions and experiences	Singal, N.	2016	India	Journal article	This research was carried out with mothers of children with disabilities living in a rural community in Chamrajnagar District of Karnataka. Data reported in this paper was generated through one-to-one semi-structured interviews with mothers and adopted a qualitative approach to examining the impact on schooling on the academic, personal, and social wellbeing of children with disabilities. This project involved multi-method approaches to data collection which included interviews with district officers, heads of school, teachers in government primary schools, Inclusive Education Resources Teachers, and Inclusive Education Specialist Teachers. In addition to this, narrative observations were conducted at the school and classroom level.

Title of output	Author(s)	Date published	Contexts covered	Type of publication	Methodology
Schools and learning in rural India and Pakistan: Who goes where and how much are they learning?	Alcott, B., & Rose, P.	2015	India and Pakistan	Journal article	Researchers use quantitative analysis of data from the Annual Status of Education Reports (ASER) conducted in India and Pakistan in 2012. This paper's focus is children whose age indicates they should be completing primary school and so should be expected to have learnt the basic reading and mathematical skills, and so they limit the sample to children aged 10–12 at the time of the survey. The key outcomes of interest are school attendance and learning.
Social distance, teachers' beliefs and teaching practices in a context of social disadvantage: Evidence from India and Pakistan	De, A., & Malik, R.	2021	India and Pakistan	Book chapter	This chapter begins by drawing on existing research to theorise a connection between social distance, teachers' beliefs, their teaching practice and student learning. It then presents empirical data from interviews with teachers and classroom observations in India and Pakistan to: (i) describe teachers' beliefs, highlighting those particularly relating to children's home backgrounds; (ii) note how teachers' beliefs vary for different children and, (iii) describe observed teaching practice and teacher– student interaction.
Teacher politics: Meeting educational quality challenges with teachers	Aslam, M., Rawal, S., Asadullah, N., Bari, F., Kingdon, G., Malik, R., & Rose, P.	2016	India and Pakistan	Background Paper for the Education Commission's The Learning Generation	This study has ring-fenced the past 10 to 15 years for the review of policy developments and reforms, with this study concentrating on identifying developments and reviewing reforms that fall in the following teacher-relevant policy areas: i) retention and deployment, ii) professional development (in- and pre-service training), iii) teacher responsibilities (including changes in pedagogical practices, in school and out of school responsibilities), and iv) accountability and monitoring.

Title of output	Author(s)	Date published	Contexts covered	Type of publication	Methodology
Teachers – an indispensable asset: examining teacher effectiveness in South Asia	Aslam, M., & Rawal, S.	2015	South Asia: India and Pakistan as well as Nepal and Bangladesh	Book chapter	This chapter highlights some of the key concerns underpinning teacher effectiveness and is based on data analysis (primary and secondary) such as labour force surveys (Bangladesh and Nepal) and rich primary school data collected from India and Pakistan as well as documentary analysis of recent literature in South Asia and other developing countries.
The myth of free and barrier-free access: India's Right to Education Act-private schooling costs and household experiences	Srivastava, P., & Noronha, C.	2016	India	Journal article	Data were collected through a house-hold survey in one resettlement block and adjacent squatter colony in Karampur slum (n=290) and semi-structured household interviews (n=40) drawn from this larger sample. Additionally, regulatory analysis conducted at the institutional level of the larger study was used to analyse actual experiences of accessing schooling, and match household understandings of the Right to Education Act against official articulations.
The teacher labour market in Pakistan	Aslam, M.	2016	Pakistan	Working paper	This report undertakes a rapid review of existing literature and summarises some key evidence on the teacher labour market in South Asia. This review is based on a quick scoping of published and unpublished research on the teacher labour force in the South Asia setting as well as in some other contexts where the low-fee private sector and non-state sectors are known to be prevalent.

Title of output	Author(s)	Date published	Contexts covered	Type of publication	Methodology
Project: Literacy development with deaf communities using sign language, peer tuition, and learner-generated online content: sustainable educational innovation					
Improving literacy for sign language users in India	Zeshan, U.	2017	India	Policy brief	'Peer to Peer Deaf Literacy' was a one-year pilot study looking at new ways of teaching literacy to deaf learners in India. The project drew on deaf people's own resources, and its curriculum tackled real-life needs while peer-guided teaching combined online and in-class learning. Piloted with 43 young deaf adult learners, the programme was implemented in the virtual learning environment 'Sign Language to English by the Deaf'.
Peer to peer deaf literacy: Working with young deaf people and peer tutors in India	Gillen, J., Panda, S., Papen, U., & Zeshan, U.	2016	India	Journal article	The Indian project activities are implemented through five deaf-led organisations (four NGOs and one school). Project staff include three deaf research assistants and five deaf peer tutors. Classes take place at the field sites every weekday morning for two hours, followed by two hours of lab sessions in the afternoons. Between 9 and 15 students attend each, for a total of 58 deaf learners. They are aged between 18 and 37, with the majority in their 20s. The classes run for six months, and a pre-test and learner survey were used to establish students' level of competence and current use of English.
Serious games in co-creative facilitation: Experiences from cross-sectoral work with deaf communities	Zeshan, U.	2020	Global South	Book	The development of Serious Games in the context of co-creative facilitation that this book reports on was initially kickstarted by multi-partner research projects on literacy and multiliteracies in deaf communities in the Global South. The author also extended the use of Serious Games to other contexts because their potential for co-creative facilitation was evident and was fitting in well with

Title of output	Author(s)	Date published	Contexts covered	Type of publication	Methodology
					facilitation in other group contexts. The author has tested all games described in this book with various real-life groups, and many games have been through multiple cycles of prototyping.
SLEND Sign Language to English by the Deaf: Literacy development with Deaf communities using sign language, peer tuition, and learner-generated online content	Ahereza, N., Nyarko, M., Fan, H. R., Gillen, J., & Zeshan, U.	2016	India, Ghana, and Uganda	Conference paper	Instead of traditional language teaching, this project takes a learner-driven and ethnographic approach, exploiting a virtual/mobile learning platform and supporting deaf peer tutors and learners to develop their own materials and strategies, including teaching through sign language. So far around forty sessions have been developed by the peer tutors and learners with a wide range of real-life topics, such as in the bank, at the railway station, forms, signs, (online) shopping, news, headlines, sports, invoices, etc.
Summary report on 'Literacy development with deaf communities using sign language, peer tuition, and learner-generated online content: Sustainable educational innovation'	Zeshan, U., Huhua Fan, R., Gillen, J., Panda, S., Papen, U., Tusting, K. P., Waller, D., & Webster, J.	2016	India, Ghana, and Uganda	Conference paper	The project uses mixed methods from action and ethnographic research and proposes a model which departs from existing traditional language teaching practices in India. It instead takes an ethnographic approach which will see the development of materials and teaching led by local deaf tutors supported by trainers both in-country and from the UK, to ensure responsiveness to learner needs. The development of a virtual/mobile learning platform (Sign Language to English by the Deaf) combined with the use of sign language and support from deaf peer tutors constitute a learner-driven, innovative methodology based on a functional approach to learning.

Title of output	Author(s)	Date published	Contexts covered	Type of publication	Methodology
Using ethnography and 'real literacies' to develop a curriculum for English literacy teaching for young deaf adults in India	Papen, U., & Tusting, K.	2020	India, Ghana, and Uganda	Journal article	In this paper, researchers examine the approach to curriculum and materials development that was adopted in this project, which implemented a 'real literacies' pedagogy rooted in the theory of literacy as a social practice. They drew on ethnographic methods to create a learner-centred curriculum using 'real' or 'authentic texts' and 'real life' uses of English, taught through a deaf-led method, which aimed to value students' everyday literacy practices and use them as the basis for language teaching.
Project: Pedagogies for critical thinking: innovation and outcomes in African higher education					
Exploring processes of teaching and learning: The case of education for critical thinking in Ghana, Kenya, and Botswana	Pon, C., & Schendel, R.	2020	Ghana, Kenya, and Botswana	Journal article	This article explores recently published literature on critical thinking, an oft-cited outcome of pedagogical reform in the region. The authors start by defining key conceptualisations of critical thinking and briefly outlining the primary canon of literature on this concept within universities. This is followed by an exploration of the interactions between this body of literature and scholarly work from three African contexts heavily represented in the literature (Ghana, Kenya, and Botswana).
Assessing 'approaches to learning' in Botswana, Ghana and Kenya	Rolleston, C., Schendel, R., & Grijalva Espinosa, A. M.	2019	Botswana, Ghana, and Kenya	Journal article	The 'Pedagogies for Critical Thinking' project is a mixed-methods study which investigates the impact of pedagogical reforms aimed at improving critical thinking skills within a sample of universities in Kenya, Ghana, and Botswana. It follows a sample of students longitudinally, assessing their gains in critical thinking skills over a two-year period, and complements these quantitative results with qualitative analysis of the

Title of output	Author(s)	Date published	Contexts covered	Type of publication	Methodology
					teaching and learning environment within each of the participating universities.
Pedagogies for critical thinking at universities in Kenya, Ghana and Botswana: the importance of a collective 'teaching culture'	Schendel, R., McCowan, T., Rolleston, C., Adu-Yeboah, C., Omingo, M., & Tabulawa, R.	2020	Kenya, Ghana, and Botswana	Journal article	Research questions were investigated through a mixed methods design, comprising a longitudinal study of student outcomes and a qualitative investigation of how institutions can encourage processes of pedagogical change. Within each of the selected research sites, a random sample of 170 incoming undergraduate students was recruited to participate in the longitudinal component of the study. All student participants completed a critical thinking assessment during their first year at university, and again during their third year.
Pedagogies for Critical Thinking: Implications of project findings for higher education policies and practices in Ghana, Kenya and Botswana	Schendel, R., McCowan, T., Rolleston, C., Tabulawa, R., Adu-Yeboah, C., & Omingo, M.	2019	Ghana, Kenya, and Botswana	Policy brief	The project followed a mixed methods approach, comprising a longitudinal study of student 'gains' in critical thinking over a two-year period and a qualitative investigation of the teaching and learning environment within the participating universities. In each country, the institutional sample included two to three research sites (generally a faculty or department within an institution), which were chosen explicitly because they have implemented a pedagogical innovation that is likely to improve student critical thinking ability.
Pedagogies for critical thinking technical note 1: Critical thinking	Schendel, R., & Rolleston, C.	2019	Ghana, Kenya, and Botswana	Journal article	Written critical thinking assessments fall into three broad categories: a) multiple-choice tests; b) essay-based tests; and c) performance-task-based tests. Of these, only performance tasks attempt to simulate the use of critical thinking skills in the 'real world'. As a result of all these dimensions, the authors elected to focus exclusively on

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					the skills element of their definition when developing scoring criteria to accompany their assessment.
Project: Promoting children’s learning outcomes in conflict-affected countries: evidence for action in Niger					
A cognitive assessment tool designed for data collection in the field in low- and middle-income countries	Ford, C. B., Kim, H. Y., Brown, L., Aber, J. L., & Sheridan, M. A.	2019	Niger and Lebanon	Journal article	This study draws on a subset of data from two large cluster randomized control trials evaluating the impact of informal education programs in Lebanon and Niger. In each country, approximately one-half of the child sample within each community or school were randomly selected to take Rapid Assessment of Cognitive and Emotional Regulations as part of a larger assessment package. In Lebanon, 1907 children (50% female, age M = 9.73) from 87 communities were assessed at baseline. In Niger, 866 children attending second to fourth grades (53% female, age M = 9.18) from 30 schools in Diffa and Maine-Soroa districts were assessed at the baseline.
Children’s learning and development in conflict- and crisis-affected countries: Building a science for action	Aber, J. L., Tubbs Dolan, C., Kim, H. Y., & Brown, L.	2021	Niger, Democratic Republic of the Congo, and Lebanon	Journal article	<p>The focus of the research is on the impact of Healing Classrooms (a set of classroom practices) on children’s academic outcomes and social and emotional learning.</p> <p>Two cohorts of school clusters were created. Cohort 1 consisted of clusters in four school districts ready to start in year 1, while Cohort 2 consisted of clusters in four other school districts that would not be ready to start until year 2. Then, through independent public lotteries in each of the participating school districts, clusters of schools were randomly assigned to start implementing HC in one of three academic years. Finally, researchers decided to</p>

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					collect data on randomly selected children in grades 2– 5 at three time points at the end of each academic year.
Examining the enumerator effect: Improving data quality through enumerator observation	Brown, L., & Ngoga, E.	2019	Niger	Journal article	The authors aim to establish a set of core competencies of enumerator quality or core knowledge and skills that they expect enumerators to be able to perform in the field. Given the nascent state of the literature on enumerator quality, the identification of these core skills will likely be a mixture of those identified in the literature as well as during field observation. They draw both from the literature as well as their experience utilising an enumerator observation protocol as part of the 3EA: Education in Emergencies, Evidence for Action study, involving a randomized field trial in Diffa, Niger.
IRC Healing Classrooms remedial tutoring programming improves Nigerien and Nigerian children's learning	Brown, L., Kim, H. Y., & Weiss-Yagoda, J.	2018	Niger	Policy paper	During the 2016-2017 school year, the IRC delivered Learning in a Healing Classroom remedial tutoring programming to 1,800 Nigerian refugee children and Nigerien local and internally displaced children in host communities. Girls were recruited at a slight majority (53%) to encourage their retention and reduce schooling disparities between boys and girls. Ninety tutoring classes enrolling 20 students had access to six hours per week of French reading and math instruction designed to build the competencies needed to succeed in Nigerien public schools. The authors used three measures to rigorously test the impact of the intervention on reading and math skills: ASER Math, ASER French Literacy, and overall public-school grade averages.

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Raising learning outcomes for girls in conflict-affected contexts	Aber, J. L., Brown, L., & Kim, H. Y.	2019	Niger	Policy brief	Researchers conducted an experimental evaluation of the Healing Classrooms programme and the targeted SEL activities. This project was designed to provide the first ever rigorous evidence of how non-formal, 'complementary' education programmes can support conflict-affected children's academic and social-emotional outcomes, and how it may impact girls' and boys' academic and social-emotional outcomes differently. A total of 1,800 children from the 30 public schools in Diffa region were randomly selected to receive Healing Classrooms programming from the 4,994 second to fourth graders who are eligible for remedial education.
Project: Peer-to-peer deaf multiliteracies: research into a sustainable approach to education of deaf children and young adults in the global South					
Peer to peer Deaf multiliteracies: Towards a sustainable approach to education in Ghana	Gillen, J., Nyarko, M., Akanlig-Pare, G., Akraasi-Sarpong, E., Toah Addo, K., & Emily, C.	2020	Ghana	Journal article	Teaching and learning were delivered by a team approach, with each peer tutor supported by either the other peer tutor or the research assistant. The supporting teacher documented the session with the aid of photographs and videos. The lead peer tutor wrote up weekly peer tutor reports and the research assistant made monthly reports. Prior to the start of teaching, the lead and secondary tutors engaged in three months of training on all necessary aspects: what are multiliteracies, how to create micro-case studies, working with the shared online platform Sign Language to English by the Deaf, etc.

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<p>Serious games in co-creative facilitation: Experiences from cross-sectoral work with deaf communities</p> <p><i>*This output also falls under another project and is listed above.</i></p>	Zeshan, U.	2020	Global South	Book	The development of Serious Games in the context of co-creative facilitation that this book reports on was initially kickstarted by multi- partner research projects on literacy and multiliteracies in deaf communities in the Global South. The author also extended the use of Serious Games to other contexts because their potential for co-creative facilitation was evident and was fitting in well with facilitation in other group contexts. The author has tested all games described in this book with various real-life groups, and many games have been through multiple cycles of prototyping.
<p>Using ethnography and 'real literacies' to develop a curriculum for English literacy teaching for young deaf adults in India</p> <p><i>*This output also falls under another project and is listed above.</i></p>	Papen, U., & Tusting, K.	2020	India, Ghana, and Uganda	Journal article	In this paper, researchers examine the approach to curriculum and materials development that was adopted in this project, which implemented a 'real literacies' pedagogy rooted in the theory of literacy as a social practice. They drew on ethnographic methods to create a learner-centred curriculum using 'real' or 'authentic texts' and 'real life' uses of English, taught through a deaf-led method, which aimed to value students' everyday literacy practices and use them as the basis for language teaching.
<p>Project: Promoting children's learning outcomes in conflict-affected countries: generating, communicating, and incorporating evidence for impact</p>					
<p>Impacts after one year of 'Healing Classroom' on children's reading and math skills in DRC: Results from a</p>	Aber, J. L., Torrente, C., Starkey, L., Johnston, B., Seidman, E.,	2017	Democratic Republic of the Congo	Journal article	To test the impact of Learning to Read in a Healing Classroom on children's reading and math skills, 40 school clusters containing 64 schools and 4,465 students were randomized to begin LRHC in 2011– 2012 or to serve as wait-list controls. Hierarchical linear models

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cluster randomized trial	Halpin, P., Shivshanker, A., Weisenhorn, N., Annan, J., & Wolf, S.				(students nested in schools, nested in school clusters) were fitted. Materials were developed for 'Learning to Read in a Healing Classroom' and 'Learning Math in a Healing Classroom'.
Improving primary education in the Democratic Republic of the Congo: End-line results of a cluster-randomized wait-list controlled trial of Learning in a Healing Classroom	Torrente, C., Aber, J. L., Starkey, L., Johnston, B., Shivshanker, A., Weisenhorn, N., Annan, J., Seidman, E., Wolf, S., & Tubbs Dolan, C.	2019	Democratic Republic of the Congo	Journal article	This article examines the impact of Learning in a Healing Classroom on four sets of outcomes: (1) the social-emotional support of schools and classrooms, (2) students' self-report of their own well-being, (3) students' math and reading performance, and (4) teachers' motivation and sense of well-being. Two groups of schools in different locations of the eastern DRC were randomized in 2011 or 2012 to start implementing the intervention in different consecutive years.
Opportunities for equitable access to quality basic education (OPEQ): Final report on the impact of the OPEQ Intervention in the Democratic Republic of Congo	Aber, J. L., Starkey, L., Tubbs, C., Torrente, C., Johnston, B., Wolf, S., Shivshanker, A., & Annan, J.	2015	Democratic Republic of the Congo	Technical report	This evaluation experimentally evaluated the teacher professional development program and integrated curricular program. The evaluation of Learning in a Healing Classroom set out to test the impact of the intervention on (a) students' reading and math skills; (b) students' social-emotional well-being, including perceptions of their schools and classrooms as supportive and caring and cooperative and predictable, as well as their mental health and peer victimization experiences; and (c) teachers' motivation and professional well-being. Research involved a cluster-

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					randomized, wait-list control impact evaluation to answer questions about whether the intervention caused changes in students' and teachers' outcomes.
Promoting children's learning and development in conflict-affected countries: Testing change process in the Democratic Republic of the Congo	Aber, J. L., Tubbs, C., Torrente, C., Halpin, P. F., Johnston, B., Starkey, L., Shivshanker, A., Annan, J., Seidman, E., & Wolf, S.	2017	Democratic Republic of the Congo	Journal article	Data used in this study are from the first and second waves of a multiyear evaluation of Learning to Read in a Healing Classroom in four subdivisions of the Katanga province in eastern DRC. This paper compares clusters that were randomly assigned to receive the program in 2011–2012 to clusters that had not yet received the program (i.e., clusters randomly assigned to begin receiving the program in 2012–2013 or 2013–2014). A total of 153 schools in four educational subdivisions in Katanga were targeted, with students in the second, third, and fourth grades randomly selected by field research staff.
Project: The Literacy Laboratory Project (LLP) under the Northern Uganda Literacy Program					
Making the grade: The sensitivity of education program effectiveness to input choices and outcome measures	Kerwin, J. T., & Thornton, R. L.	2021	Uganda	Journal article	The study was conducted on 1,900 first grade students in 76 classrooms in 38 government schools across five Coordinating Centres in the Lango sub-region. Schools were assigned to one of three study arms via public lottery: control, full-cost program, and reduced-cost program. Researchers assess student learning using baseline and endline exams. They measure reading skills using the Early Grade Reading Assessment, an internationally recognized exam designed to assess early reading. To capture students' ability to write, they use a writing assessment designed by Mango Tree.

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Project: Toward the development of a rigorous and practical classroom observation tool: the Uganda secondary school project					
Assessment of pedagogical practices and processes in low- and middle-income countries: Findings from secondary school classrooms in Uganda	Seidman, E., Kim, S., Raza, M., Ishihara, M., & Halpin, P. F.	2018	Uganda	Journal article	Towards the end of the 2013 and 2014 academic years, pairs of raters observed and rated TIPPS dimensions in 371 7th and 366 8th grade classrooms, respectively. The TIPPS consists of an observer sheet that lists the 18 dimensions and a detailed training manual. The TIPPS manual was designed to be short, focusing exclusively on a guiding rationale for each core dimension, its behavioural indicators, examples of each teacher practice and classroom process (the phenotypic expressions), and with ease of making reliable categorical decisions in a four-point format.
Can a classroom observation tool improve teaching in Uganda?	Seidman, E.	2018	Uganda	Policy brief	The Teacher Instructional Practices and Processes System (TIPPS) observational tool examined the quality of teaching practices and classroom processes through live observations in Uganda. Areas of observation included students' ability to solve complex problems, and the teacher's ability to manage and promote a positive classroom environment. The study used TIPPS data collected in the classrooms of 197 Ugandan secondary schools and matched it with eighth grade achievement data from biology, English and mathematics. Pairs of locally recruited observers were trained to observe classrooms and were asked to match their observations to a manual that outlines 18 behavioural indicators known as 'TIPPS dimensions'.

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Improving 21st-century teaching skills: They key to effective 21st-century learners	Kim, S., Raza, M., & Seidman, E.	2019	Uganda, India, and Ghana	Journal article	This paper focuses on the need to measure the social quality of teaching processes in a contextualized manner. The authors do so by highlighting the efforts made to develop and measure teacher practices and classroom processes using the Teacher Instructional Practices and Processes System (TIPPS) in three different contexts: Uganda (secondary), India (primary), and Ghana (pre-school). By examining how such a tool can be used for teacher feedback, reflective practice, and continuous improvement, the hope is to pave the way toward enhanced 21st-century teacher skills and, in turn, 21st-century learners.
Measuring and predicting process quality in Ghanaian pre-primary classrooms using the Teacher Instructional Practices and Processes System (TIPPS)	Wolf, S., Raza, M., Kim, S., Aber, J. L., Behrman, J., & Seidman, E.	2018	Ghana	Journal article	Data for this study came from the baseline of a two-year, three-wave impact evaluation of an in-service teacher training and parental engagement program implemented in six districts in the Greater Accra Region in Ghana. The total sample came from 108 public schools and 132 private schools. Every kindergarten classroom in each school was included, and fifteen children were randomly selected from each school roster to participate in direct assessments. Nearly all teachers (97.9%) agreed to be videotaped and participate in the survey, which was conducted by trained enumerators. The total sample size for the classroom observations was 317 teachers/classrooms.

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Project: Transforming the pedagogy of STEM subjects					
Making the grade: The sensitivity of education program effectiveness to input choices and outcome measures	Abate, T., Michael, K., & Angell, C.	2020	Ethiopia	Journal article	<p>The development of an assessment tool to measure scientific reasoning of this kind seeks a guiding framework. As the key concepts are scientific reasoning, and development of the tool, two fundamental frameworks were utilised. These were: 1) the styles of scientific reasoning framework and 2) the development framework of Senocak's that considers the development of items for each style and level.</p> <p>In this study, 40 items were developed, pilot-tested, and administered to 242 students from grade eight. Items were developed from the contents of grade 7 and 8 physics subject from which students learned.</p> <p>For the analysis of the items, Rasch model was further used because Rasch analysis allows construct-driven assessment procedures that help to develop progressive levels of a construct.</p>
Development and validation of a test of in-service science teachers' epistemic knowledge in electricity and magnetism using Rasch Analysis	Tarekegn, G., Alemu, M., Tadesse, M., & Kind, P. M.	2020	Ethiopia	Journal article	<p>Through an in-depth examination of the course General Physics II of the Ethiopian integrated science teacher training curriculum, epistemically challenging concepts were identified. The set of test objectives was evaluated by instructors at the college to ensure all epistemically challenging concepts were considered. The test was then developed in a constructed-response format. Researchers prepared constructed-response items to measure the epistemic knowledge targeted in this test.</p>

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					They administered the test to 156 graduating in-service natural science teachers.
Dialogic teaching in a teacher education college: An analysis of teacher educator and pre-service teacher talk in physics classrooms	Worku, H., & Alemu, M.	2020	Ethiopia	Journal article	The study was conducted at one of the government colleges of teacher education in Ethiopia, which was engaged in preparing teachers for primary schools. This study is a case study that describes the nature of the teacher educator's and preservice teachers' talk in their natural context. Observations of classroom teaching and learning with the help of recorded videos were used to collect the data. The participant teacher was selected purposefully as he was the only teacher in the college who had been trained in dialogic teaching and had experience of using the approach in his own classrooms.
The knowledge gap between intended and attained curriculum in Ethiopian teacher education: Identifying challenges for future development	Alemu, M., Kind, V., Basheh, M., Michael, K., Atnafu, M., Kind, P., & Rajab, T.	2021	Ethiopia	Journal article	The study employed a mixed method design. The attained curriculum was analysed via a physics knowledge test given to preservice teachers at the beginning and end of their third, final academic year. Test items were accessed from the publicly available TIMSS item banks were known. This permitted comparison of Ethiopian preservice teachers' attainment scores on individual items with international mean values and extreme values, that is, the highest and lowest scoring nations in TIMSS.
Transforming teaching quality through active learning in Ethiopia	Kind, V.	2018	Ethiopia	Policy brief	Phase 1 observed teachers' practices before and after they were introduced to dialogical teaching. In this phase, 11 lecturers from six colleges of teacher education were given intervention training at the beginning of the 2015/16 academic year and implemented dialogical teaching into

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					<p>physics courses during that year. A control group from four colleges was established for comparison. A total of 449 student teachers from both groups took part. Phase 2 worked with teachers and students (Grades 7 and 8) from 52 different schools across Ethiopia. The 11 lecturers from the treatment group in Phase 1 helped to deliver intervention training to the physics teachers. This phase tested strategies for bringing about lasting change to teacher practices and student learning by introducing both pre-service teacher training and professional development for experienced teachers.</p>