SeeBeyondBorders

An Assessment of Early Grade Teaching Quality in Cambodia

Battambang Province,
Cambodia
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Document Information

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Glossary

BEST	Battambang Education Support Team (previously Battambang P-ESWG)
B. Ed	Bachelor of Education (Degree)
BVL	Bavel District
CCWC	Commune Children and Women's Committee
CDPF	Capacity Development Partnership Fund
CPD	Continuing Professional Development
D&D	Decentralisation and De-concentration
DP	Development Partners
DOE	District Office of Education
DTMT	District Training and Monitoring Team
ECE	Early Childhood Education
EFA	Education for All
EGMA	Early Grade Mathematics Assessment
EGRA	Early Grade Reading Assessment
ESD	Education for Sustainable Development
ESP	Education Strategic Plan
ESWG	Education Support Working Group
G1	Grade 1
G2	Grade 2
G3	Grade 3
GER	Gross Enrolment Rate
INGO	International Non-Governmental Organisation
INSET	In-Service Education and Training
MoEYS	Ministry of Education, Youth and Sport
MoFA	Ministry of Foreign Affairs
MPL	Minimum Proficiency Level
NEP	NGO Education Partnership
NER	Net Enrolment Rate
NGO	Non-Governmental Organisation
P-ESWG	Provincial Education Supporting Working Group (now known as BEST)
PLD	Professional Learning and Development
POE	Provincial Office of Education
PRESET	Pre-Service Teacher Education
PTTC	Provincial Teacher Training College (primary teachers)
QTLS	Quality Teaching and Learning in School (initiatives)
RGC	Royal Government of Cambodia
RTI	RTI International is a not-for-profit organisation headquartered in North Carolina USA, providing research and technical services
RTTC	Regional Teacher Training College (lower secondary teachers)
SBB	SeeBeyondBorders
SCALE	Scaffolding Capability And Learning Experiences (collective name for SeeBeyondBorders' quality teaching programs)
SDG	Sustainable Development Goal
SEST	Siem Reap Education Support Team
SSC	School Support Committee
TCP	Teacher Career Pathway
TGL	Technical Grade Leaders
THK	Thmor Kol District
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNICEF	United Nations International Children's Emergency Fund (Now known as United Nations Children's Fund)
UIS	UNESCO Institute of Statistics

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Executive Summary

Objectives and scope

The World Bank (2017a) states that "for millions, schooling is not producing enough learning. Learning outcomes in basic education are so low, in so many contexts, that the developing world is facing a learning crisis" (p. 71). Data from UNESCO (UIS, 2017) reveals that in Central and Southern Asia, 81% of children will not meet minimum proficiency levels (MPLs) in reading "by the time they are of age to complete primary and lower secondary education" (p. 7), and that 76% will not meet MPLs in mathematics (p. 24).

UNESCO (2017) reports in its article discussing the 'learning crisis' that: "Most surprising – and alarming – is that two-thirds of the kids [sic] who are not learning are in school".

Poor educational outcomes for Cambodian children have been recognised by the Cambodian Government. The Ministry of Education Youth and Sport's Mid-term Review of its Education Strategic Plan 2014 – 2018 and Projection to 2020, (MoEYS, 2016) states, "Though overall enrolment in primary education is high, a large proportion of children are not acquiring the basic proficiencies of Khmer reading and writing and mathematics skills. Assessments show that learning difficulties start in the early grades. A series of consistent interventions are needed to improve learning of children in primary school, including on teaching approaches and practices, curriculum, and textbooks" (p. 88).

This work is therefore predicated on a shared concern with the Cambodian Government that in many areas of Cambodia, children are not learning at school, and further, that this is due to the poor quality of teaching, beginning in early grades. The Organization for Economic Co-operation and Development (OECD, 2005), eludes to this causality, stating what is now a widely accepted fact when it says "'Teacher quality' is the single most important school variable influencing student achievement" (p. 7).

This assessment report identifies priority Quality Teaching and Learning in School (QTLS) interventions to address the "learning crisis" in relation to Cambodia, and improve learning in early grades.

Our recommendations as to the required QTLS interventions, are based on:

A. A research assignment that assessed early grade student outcomes and teaching quality in two districts in Battambang Province (North-Western Cambodia);

B. Experiences gained through the work undertaken by SeeBeyondBorders since 2009 to improve learning outcomes through teaching quality in Cambodia; and

C. A literature review of relevant published work that sheds further contextual light on the current situation in Cambodia, and how to address the structural problems identified.

Overall, our rationale for undertaking this work is our contention that the quality of an education system and hence the outcomes for its students, will only be sustainably improved if the quality of teaching in that education system is high, and that identifying an appropriate and achievable means to improve teaching quality is an immediate priority in Cambodia.

Information gathering

The research assignment sought to assess, within a sample of rural primary schools, the levels of student proficiency, the levels of teachers' subject knowledge and the levels of teachers' pedagogical skills, as relevant to the mathematics curriculum. Conducted in June 2017, the research centred on the situation in grades 1, 2 and 3, in 20 schools in Bavel and Thmor Kol districts in Battambang Province. 1,001 children in 60 classes were tested but two teachers taught two classes (working double shifts), so teacher knowledge and skills testing was conducted on 58 teachers. The research also involved interviews with school principals, District Training and Monitoring Team (DTMT) members, and District Offices of Education (DOE) directors, to better understand the challenges faced by the teachers in these districts.

Secondary sources were widely researched to identify the context of the primary research results and to frame our recommendations as to QTLS interventions. Three reports in particular provided significant insight into contextually appropriate interventions. These were: the McKinsey report (Mourshed, M., Chijioke, C., Barber, M., & McKinsey and Company, 2010); Hargreaves' four ages of professional development (2000); and the World Bank report "World Development Report 2018: Learning to realize education's promise" (World Bank, 2017a).

Our findings also draw from SeeBeyondBorders' experiences of designing and implementing teaching capacity development programs in target districts in rural Cambodia. The learnings, experience and insights gained through this work have also informed our approach to assessing the factors which influence teaching quality in the research districts. We have also considered the challenges that need to be addressed if the experiences and interventions of SeeBeyondBorders were to be scaled up to cover a majority of education districts in the country.

Findings and Conclusions

It is our conclusion that the global 'Learning Crisis' as identified by UNESCO (2017, p. 21) amongst children at school, is a reality in Cambodia. We base this on our own research, our experience from working in Cambodia, and on the work of other commentators. While a wide range of factors contribute to this situation, we conclude that the most immediate is the poor teaching practice that stems from teachers' lack of knowledge and skills. ("Teachers are the most important factor affecting learning in schools" World Bank, 2017a, p. 10). However, this is no real surprise given the poor quality of teacher training, and the absence of systemic in-service teacher development. Teachers have not had good teaching practice modelled to them, and are not able to conceptualise what good student learning might look like.

Overall, student learning is not being widely tackled at this point and the causes and effects may not be well understood. World Bank (2017a) says "The learning crisis is real, but too often education systems operate as if it is not. Many policy makers do not realize how low learning levels are. Others do not acknowledge them or simply equate low learning with low resources" (p. 83).

Specifically, our findings are that:

- Student testing revealed very poor understanding of the basic mathematical concepts included in the grades 1-3 curriculum. Pass rates (students achieving a mark of 50% or better) in grade 1 were 36%, falling to 7% by grade 3. Results get progressively worse as students miss key concepts. Gaps are not filled in due to teachers rigorously following the text books, and introducing new aspects of the curriculum before students' foundational knowledge and understanding are developed.

- With over 90% of children failing to reach a minimum standard by grade 3, the indication is that of those children who do stay in school, a handful at best will be able to pass independently set examinations of their basic ability by the time they reach grade 6. Further, given the economic pressures evident on the communities included in the study, there is little incentive for children to stay in school and every temptation for families to have their children take on work, as soon as they are physically able to do so. This is a tragedy on many levels and is reflected in the school dropout rates.

- Although we did not specifically examine the correlation between drop out and learning outcomes in the research, it is clear from the literature review that students and their families become demotivated by low levels of achievement, and see no reason to continue in school where they are not acquiring the vital basic knowledge on which to build their learning so that they can achieve in the higher grades. (See Section 2.3.)

- The result of the teacher knowledge test, comprising questions grades 1-3 students should be able to answer, demonstrate an inadequate understanding of basic concepts by the majority of teachers. 29% of teachers failed to achieve a mark above 50% in the test and the average score achieved was 65%. Further, classroom observations of teacher practice showed that only one of the 58 teachers in the research sample demonstrated competence in all six basic teaching skills assessed, and most teachers were unable to demonstrate any of these skills to any level of proficiency.

- It is our assessment that the key reason for the weakness of the teaching observed was a lack of teacher knowledge and skills. Despite being 'qualified' as teachers, they just don't know how to teach. This conclusion is confirmed by the improvement achieved by teachers in SeeBeyondBorders programs (see Section 5) from its approach to teaching knowledge and skills. With the right training and support, teachers definitively have the capacity to learn to teach better and improve their student outcomes.

- Skills would typically be enhanced through in-service teacher development, but the teachers in our research area reported that very little of this support was provided. Without a formal in-service program, a teacher may rely on guidance from a colleague or their principal, or even a member of the DTMT. However, we found these processes to be almost non-existent or weak at best.

- The view of teachers that they lack adequate initial and ongoing professional training and support, and have poorly resourced classrooms, is a view corroborated by the interview responses from school principals. Inadequate funding at a Provincial, District and school level is blamed for an inability to provide teachers with even basic mathematical resources, appropriate teacher training, ongoing professional development, or professional support. However, our experience suggests that poor knowledge and skills at multiple levels in the education system is generally the foundational problem. It is not necessarily simply lack of funding.

- Cambodian teachers are often loudly and publicly criticized for having a 'poor attitude', with 60% of principals in the research project considering early grade teachers have a poor level of commitment. Our research suggests that the apparent poor attitude and commensurate low self-esteem levels amongst teachers are largely a result of lack of confidence in their own skills and ability to teach effectively.

- When both teachers and principals were asked about challenges faced by teachers, the results showed a sizable gap between their respective perceptions. These differences suggest a lack of mutual trust and little notion of working in collaboration towards a common goal. Principals expressed some resentment over a perceived casual or less professional attitude amongst teachers. Observers concluded that this stemmed from two points:

  i. A sense of isolation amongst teachers and a belief that they were doing their best under difficult circumstances with very little support; and

  ii. A sense of frustration amongst principals at their lack of authority over teachers and their lack of ability and resources to help teachers when they, as principals, carry the responsibility for the teachers' actions or inactions.

- If the continued training of fledgling teachers is to be effective beyond the fence of the teacher training colleges, and schools are to be supportive of ongoing quality teaching, then priority must be given to establishing a strong training and mentoring program for the teachers already teaching. This will ensure that good quality teaching can be modelled by the current teachers in schools when new teachers arrive. Only in this way will new teachers, on graduation, enter a professionally supportive environment.

Recommendations

We have concentrated our recommendations on actions to address what we argue are the most basic and immediate requirements to begin the process of improving the quality of education, so as to have children already in school meeting the minimum proficiency levels (UNESCO 2017), at least in early grades, in Khmer and mathematics.

Our recommended QTLS interventions require some modification to the blend of interventions currently being focused on by the Ministry, and that consideration be given to "using evidence of what works and what doesn't to guide education decision-making" World Bank (2017b). Of particular importance of course, is what does (and doesn't) work in a Cambodian - not just a global - context.

The QTLS interventions together create a framework structure to address the central causes of the 'learning crisis' and:

  a) allow teachers to understand how to progress from where they currently stand towards quality teaching; and

  b) identify what has to be in place systemically to allow all teachers to build a solid foundation of subject knowledge and pedagogical skills.

They are deliberately set at a systemic and not at a local level. We have therefore not attempted to define detailed local interventions and design localised projects through this report. Rather we have attempted to set out a structure that the Ministry, Development Partners, and other organisations whose goals are aligned with the broad principle of improving learning, might agree on and link more localised and detailed interventions to.

We have approached our recommendations in three sections:

  1. The first is to state what we recommend is implemented, being the QTLS interventions;

  2. The second is to recommend how to get started in this endeavour; and

  3. The third is to show how the recommended steps address and integrate with approaches recommended by the World Bank and by McKinsey, bearing in mind the current situation in Cambodia.

QTLS interventions

Coherence and integration is a theme for the QTLS initiatives, which in summary are as follows:

1. **Build teacher knowledge and skills** - Teachers need the subject knowledge and pedagogical skills to be able to teach, requiring that a program to build basic teaching capability be established.

2. **Establish mentoring** – Effective teacher professional development requires "significant continual support—not one-off workshops" (World Bank, 2017a, p. 132) – amongst other things. Back up and technical support in the classroom is essential for putting into practice newly acquired knowledge and skills.

3. **Introduce teacher performance incentives** - "Teachers need to be treated as professionals, and good professionals receive support and respect, but are also held to high expectations. A system that does not pay attention to what its teachers are doing does not afford teachers the respect they deserve" (World Bank 2017a, p. 136). These incentives may be relatively simple in the first instance, helping teachers to fortify their intrinsic motivation as developments on Teacher Career Pathway (TCP) progress.

4. **Reinvigorate DTMTs** - "The fact that another person may observe their performance offers a form of professional motivation. So do evaluations, where teachers expect their performance to be assessed" (World Bank, 2017a, p. 138). DTMTs can offer invaluable support and quality control to a system that is developing.

5. **Set targets, gather data and perform assessments** - "A lack of good measurement means that education systems are often flying blind—and without even agreement on the destination." (World Bank, 2017a, p. 112). There is little to add in terms of the importance of this intervention to help steer learning across all aspects of the work of students, teachers and the system itself.

6. **Develop and distribute learning resources** - Good teaching practice, perhaps particularly in early grades, requires a variety of teaching and learning resources which are all but absent in many of the schools where SeeBeyondBorders conducted its research or has worked. These do not need to be overly expensive, but making some inroads on equipment in schools is essential, allowing students to have hands on, practical experiences of concepts rather than simply rote learning and chanting.

7. **Assist low performing schools (Deemed priority 2)** – Inevitably there will be those schools that struggle and the system needs to be geared up and structured so that it can help.

8. **Improve Human Resource Management** – This initiative goes to the amount of time on task that is available to students. It would make a significant impact if this could be increased, however that would involve not only addressing inefficiencies in the schools, but also structural factors that allow or require all those in the education system to work on matters that are not focused on learning in schools as well as the wider problem of the distribution of qualified teachers in the system.

Collectively these 8 interventions interlink as depicted in the following diagram, to address the core requirement for children to learn at school, which can be identified by their meeting Minimum Proficiency Levels in independently managed competency tests.

Diagram 1: Interlinking of QTLS Interventions
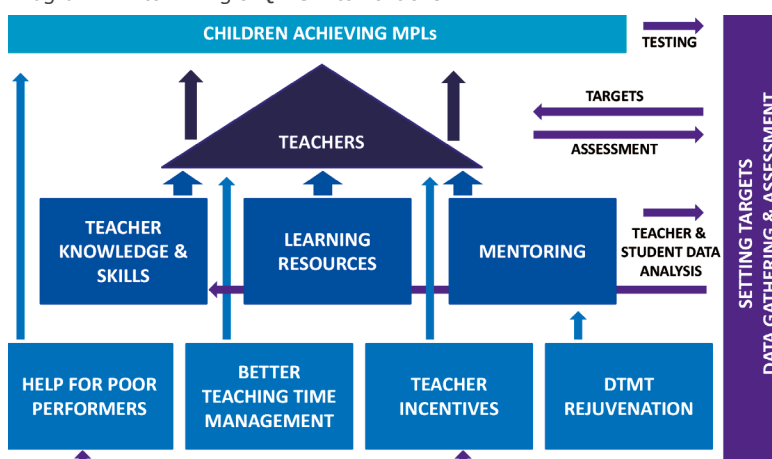
Starting the intervention process

The World Bank (2017a) suggests a process for setting about the task of addressing the learning crisis. This involves assessing the situation, acting on evidence, and aligning the system towards learning. We recommend adopting this approach in the first instance to ensure the learning crisis becomes visible and interventions gain widespread support. Specifically, our recommendations are that the following steps be undertaken under each of the associated headings in World Bank (2017a, p. xii) as shown below in bold:

1. **Assess learning** by conducting additional research and assessment to identify the extent to which students are or are not meeting MPLs.

2. **Make schools work for learning** by beginning with a set of targets which address learning shortcomings (based on the learning assessments referred to in 1 above) to which interventions are then aligned. Relate these to achieving MPLs.

3. **Align actors** by de-prioritising initiatives around pre-service training and the implementation of a *continuing* professional development (CPD) system, to focus first on the immediate priority of establishing a *basic platform* of professional knowledge and skills for current teachers.

Alignment of QTLS interventions with the literature

The QTLS interventions are informed by the themes researched in the literature review (see Section 2) which have been categorised as follows:

• Challenges to providing a good quality education system in Cambodia.

• Impact of quality teaching on student learning outcomes.

• Effective use of evaluation and assessment data.

• Interventions for developing an education system and guiding it to excellence.

• Teacher professionalism and professional capital.

• Initial and continuous professional development and ongoing support mechanisms.

• Education for sustainable development.

In addition to these themes, the authority for our framework of QTLS recommendations is drawn from the McKinsey report (Mourshed et al., 2010). This identifies that the most appropriate interventions for an education system are determined by both the stage it has reached on its improvement journey, and by the level of professional development achieved by its teachers on a scale of mastery of subject knowledge and pedagogical skills. Accordingly, we have contextualised our interventions, given where the Cambodian education system and its teachers currently stand, assuming that it will aim to prioritise achieving at least the minimum proficiency levels (UNESCO, 2017) in grades 1 to 3.

By publishing this material and our recommendations, we aim to encourage those working in the education sector to engage in further meaningful exploration of the actual situation in schools in Cambodia.

1 Introduction

This research report identifies priority Quality Teaching and Learning in School (QTLS) interventions to improve the learning in early grades in Cambodia. It aligns closely with the Cambodian Government's Education Strategic Plan 2014-2018 (2014) which has as its stated aim, "to enhance the quality and relevance of learning" (p. 8). It is also in line with the priorities outlined by BEST members in 2016 who identified 'quality of teaching' as a key development focus area within Battambang Province.

1.1 Background of the study

This work is predicated on our concern that in many areas of Cambodia, children are not learning at school, and this is due to the poor quality of teaching. We support this assertion of ours by looking at:

- The World Development Report 2018 (World Bank, 2017a) that states that "schooling is not producing enough learning" (p. 71), describing this situation as a "learning crisis" for the developing world; and

- The Ministry of Education Youth and Sport's Mid-term Review of its Education Strategic Plan 2014 – 2018 and Projection to 2020, (MoEYS, 2016) that states "Though overall enrolment in primary education is high, a large proportion of children are not acquiring the basic proficiencies of Khmer reading and writing and mathematics skills." (p. 88).

> "What drives the learning shortfalls is becoming clearer thanks to new analyses spotlighting both the immediate cause—poor service delivery that amplifies the effects of poverty—and the deeper system level problems, both technical and political, that allow poor-quality schooling to persist."
> World Bank 2017a (p. 4)

Data from UNESCO Institute of Statistics (UIS) released in September 2017 (UIS, 2017) reinforces the assertion that children are not learning in school across Central and Southern Asia, revealing that 81% of children in Primary and Secondary education (aged between about 6 and 14 years) will not meet minimum proficiency levels (MPLs) in reading (p. 7), and that 76% will not meet MPLs in mathematics (p. 24). Two thirds of these children are in school (p. 10).

Further, it has been widely asserted that of all factors playing a role in shaping a child's educational success, nothing matters at school as much as the quality of teaching (The Economist, 2016; Fullan & Hargreaves, 2016). Research shows that if a teacher provides good quality teaching, student learning is positively affected and student achievement improves.

Much of the current global research into teaching focusses on identifying what 'quality teaching' looks like and how this impacts student learning outcomes. There is some ambiguity around whether it is the quality of the teaching that is being evaluated, or the quality of the teacher. We acknowledge that both are important, but we argue that the starting point for systemic change, and the foundation for good policy intervention in Cambodia today, should be to focus on getting all teachers to teach better.

In a 2015 study considering the impact of teaching quality on student attainment in Cambodia, Tandon and Fukao concluded, "Over a single school year, students with a poor teacher master 50 percent or less of the curriculum for that grade... By upgrading its teaching force quality, Cambodia can raise student achievement substantially" (Tandon & Fukao, 2015).

Many recent studies report that the quality of teaching in Cambodia is poor (Tandon & Fukao, 2015; CDRI, 2014 as cited in World Economic Forum, 2014) and indeed the quality of education in Cambodia is ranked amongst the lowest in South East Asia (World Economic Forum, 2014, p. 16). However, research relating specifically to the quality of mathematics teaching in Cambodia, is relatively sparse. While some analysis has been carried out with Early Grade Mathematics Assessments (EGMA) to identify learning outcomes, little work has been published relating to observed or assessed knowledge of teachers who operate in classrooms on a daily basis. In general, there has been a lack of focus on identifying the underlying issues or needs which a) may be culturally or contextually specific to Cambodia, and b) differ according to the context within the country. For example, the issues and needs of rural schools are often very different from those of urban schools.

The Ministry of Education, Youth and Sport (MoEYS or the "Ministry") has many achievements to its credit in terms of

access as it strives to rebuild Cambodia's education system, following its complete destruction under the Khmer Rouge. It continues to set an ambitious national agenda for education reform, for which there remains strong international support. However, MoEYS (2016) states that "Findings from the learning assessments are not well-integrated into decision-making process[es] to improve system performance" (p. 89). It is this shortcoming, in the identification of appropriate policy to address the lack of learning, that we see as the starting point for highlighting the need to integrate QTLS interventions into Education Policy as an absolute priority topic, to be addressed now.

Despite the Ministry's achievements, simply attending school does not guarantee learning. The World Bank 2018 report (2017a) identifies that "Intuitively, many of education's benefits depend on the skills that students develop in school... None of these capabilities flows automatically from simply attending school; all depend on learning while in school" (p. 45) and "Simulations show that providing all students with basic cognitive skills could massively boost economic outcomes, especially in developing countries" (p. 46).

Our shared concerns with BEST have been that sufficient learning is not taking place within schools in Battambang Province and that:

- Students are not demonstrating a good understanding of basic mathematic concepts and as a result are not demonstrating the appropriate outcomes for their age or stage of development;

- Teachers' knowledge of the grades 1-3 curriculum and their understanding of basic mathematics concepts is poor; and

- Teachers possess poor teaching skills.

Investment in building the knowledge and skills of the teaching body as a whole, on which individual teachers can draw - in a professionally supportive environment – will open the door to higher quality teaching and ultimately to greater economic prosperity for the country. However, without strong foundations, interventions with lofty ideals are unlikely to be effective or sustainable.

1.2   Problem statement – Children are not learning at school

As mentioned previously, UNESCO Institute of Statistics (UIS) signalled "a learning crisis" (UIS, 2017, p. 21), identifying that 56% of primary school aged children and 61% of lower secondary aged adolescents worldwide, are not achieving minimum proficiency levels in reading and mathematics (p. 2). Two thirds of these children are in school (UNESCO, 2017, p. 10).

UIS (2017) concludes "The data suggests the new numbers are rooted in three common problems:

I.   First, lack of access, with children who are out of school having little or no chance to reach a minimum level of proficiency;

II.   Second, a failure to retain every child in school and keep them on track;

III.   Third, the issue of the quality of education being delivered in the classroom." (p. 21)

Given the level of enrolment now being achieved in schooling in Cambodia, we question whether the first problem, being access to school, continues to be broadly relevant or a major reason for children not having a chance to reach a minimum level of proficiency. Then with respect to the second problem, being the failure to retain every child in school, again we ask whether this might relate to the lack of learning that is happening in school; in which case, it all comes down to what is happening, or not happening, in the classroom and leads to our contention that children are not learning in school.

Jaime Saavedra, former Peruvian Education Minister, and now the World Bank's Senior Director for Education quoted in World Bank (2017b) says "Developing countries are far from where they should be on learning. Many do not invest enough financial resources and most need to invest more efficiently. But it is not only a matter of money; countries need to also invest in the capacity of the people and institutions tasked with educating our children".

1.3 Objectives

The overall objective of this research report is to identify relevant and appropriate interventions that will address the root causes of children not learning in school and in particular, address the third of the problems identified by UIS (2017), being "the quality of education being delivered in the classrooms" (p. 21). (The problems identified by UIS (2017) are listed in section 1.2 above).

The research component of this study was set up to assess the teaching quality of early grade teachers in primary schools in certain districts in Battambang Province, to determine whether in-service teacher training is needed (or would be useful) in order to improve teaching quality in these districts. The research focused on Maths teaching with the specific aims being to:

- Understand the level of grade 1-3 teachers' knowledge and teaching skills in Maths

- Assess grade 1-3 students' Maths knowledge through assessment of learning outcomes

- Find out the challenges faced by both school principals and teachers when trying to improve the quality of teaching

- Understand what training teachers have already received, what training might be needed in future and what support might be needed to improve teaching quality

The interventions identified within this report rely significantly on the findings of this research, while incorporating other evidence from relevant literature and SeeBeyondBorders' broader experience to ensure they are both contextually appropriate and relevant to the situation as identified in early grades in Cambodia.

1.4 Scope

The recommendations as to QTLS interventions included in this report are based on:

A. A research assignment that assessed early grade student outcomes and teaching quality in two districts in Battambang Province (North-Western Cambodia);

B. Experiences gained through the work undertaken by SeeBeyondBorders since 2009 to improve learning outcomes through teaching quality in Cambodia; and

C. A literature review of relevant published work that sheds further contextual light on the current situation in Cambodia, and how to address the structural problems identified.

The research assignment conducted in June 2017, centred on the situation in grades 1, 2 and 3, in 20 schools in two districts in Battambang Province. It also involved interviews with school principals, District Training and Monitoring Team (DTMT) members, and District Offices of Education (DOE) directors to better understand the challenges faced by the teachers in these districts.

At the commencement of the research component of this project, testing was conducted in the target schools to identify student achievement rates in Maths and compare these to those identified by UIS for Central and Southern Asia so as to contextualise the size of the problem, at least in these schools. However, we note that it would not be valid statistically to extrapolate these results on their own to wider areas because of the limitations in the sampling conducted.

Having taken a snapshot of student achievement through a testing process, the research progressed to examine the capabilities of the teachers. Primary data was gathered from testing, observation, and interviews to examine the following:

A. Teachers' knowledge and skills;

B. Teachers' attitudes and beliefs relating to the levels of confidence they have in their skills, and their attitudes to their jobs; and

C. The professional support and development opportunities provided or available to teachers.

Secondary sources were widely researched to identify the context of the primary research results and to frame our recommendations as to QTLS interventions. Three reports in particular provided significant insight into contextually appropriate interventions. These were: the McKinsey report (Mourshed, M., Chijioke, C., Barber, M., & McKinsey and Company, 2010); Hargreaves' four ages of professional development (2000); and the World Bank report "World Development Report 2018: Learning to realize education's promise" (World Bank, 2017a).

The recommendations for QTLS interventions also draw from SeeBeyondBorders' experience with designing and implementing teaching capacity development programs in target districts in rural Cambodia. The learnings, experience and insights gained through this work have informed our approach to assessing the factors which influence teaching quality in the research districts.

There is wide consensus that the early years of schooling are vital for building every child's understanding of concepts, enabling them to think critically and problem solve. However, there are many factors which can significantly impact the chances of a Cambodian child receiving an effective education in these early years, many of which stem from poverty. These factors include: lack of parental understanding of, or commitment to, the importance of education; economic constraints on families, including families' need for the labour of their children; the itinerant nature of employment; poor nutrition and health; and the approach taken towards people with disabilities.

This report does not attempt to explore all these factors, but instead focuses on schools where, despite these challenges, students are in school but may be experiencing learning gaps and poor learning outcomes in their early years of education, due to poorly resourced schools and poor quality teaching.

We also acknowledge that there are a number of social and cultural factors contributing to teachers' level of competence and motivation and the level of social capital they bring to their role, but we have not attempted a thorough examination of issues such as the status of teachers, their economic situations, or MoEYS's approach to personnel management in schools. Whilst there has, historically, been a view that low teacher pay and lack of accountability have been amongst the most significant barriers to teachers providing a quality education in Cambodia (Prigent, 2016), it is our contention that the immediate priority for Cambodia is no longer pay and accountability. It is the lack of subject knowledge and pedagogical skills that first precipitates teachers' poor attitudes to their roles and lack of confidence in their ability, and this is then exacerbated by the multitude of other externalities. World Bank (2017a) states "though higher salaries could attract more capable candidates to the profession over time, raising salaries is no quick fix for shortcomings in motivation or effort" (p. 137).

1.5 Significance

Perhaps this topic is best highlighted by some commentary from World Bank (2017a). Firstly, "Schooling without learning is a terrible waste of precious resources and of human potential. Worse, it is an injustice. Without learning, students will be locked into lives of poverty and exclusion, and the children whom societies fail the most are those most in need of a good education to succeed in life." (Jim Yong Kim, cited in World Bank, 2017a, p. xi). The same paper later states: "Learning shortfalls during the school years eventually show up as weak skills in the workforce. Thus the job skills debate reflects the learning crisis." (p. 9).

Poor educational outcomes for Cambodian children have been recognised by the Government. MoEYS, 2016 states "Assessments show that learning difficulties start in the early grades. A series of consistent interventions are needed to improve learning of children in primary school, including on teaching approaches and practices, curriculum, and textbooks" (p. 88).

By publishing this material and our recommendations, we aim to encourage those working in the education sector to engage in further meaningful exploration of the actual situation in schools in Cambodia. Romer, cited in World Bank (2017b) states: "The only way to make progress is to 'find truth from facts.' If we let them, the facts about education reveal a painful truth. For too many children, schooling does not mean learning".

2   Literature Review

2.1   Introduction

The very recent UNESCO Institute for Statistics (UIS) report (2017) reveals that worldwide, "More than 617 million children and adolescents are not achieving minimum proficiency levels (MPLs) in reading and mathematics" adding that: "The new data signals a tremendous waste of human potential that could threaten progress towards the Sustainable Development Goals" (p. 1). Even more startling is their finding that 68% of these children are in school, but by the time they reach the last grade of primary they will not have achieved the minimum level of proficiency in reading and mathematics (p. 10). The report comments: "These findings show the extent to which education systems around the world are failing to provide a quality education and decent classroom conditions in which children can learn" (p. 10). The report shows that the issue of 'quality education' is a worldwide concern. The World Bank Report 2018 (2017a) highlights another important consideration: "Rapid technological change raises the stakes: to compete in the economy of the future, workers need strong basic skills and foundations for adaptability, creativity, and lifelong learning" (p. xii).

Our research shows that many of the global concerns around education quality are also being evidenced in Cambodian schools, and this report endeavours to highlight some of these issues in the Cambodian context.

This literature review identifies relevant historical and current literature that explores current practice both in a global context and in a local, Cambodian context, around several broad themes:

- The challenge of providing a good quality education system in Cambodia
- Quality teaching and its impact on student learning outcomes
- Using evaluation and assessment data effectively
- Formulating effective and contextually appropriate interventions for developing an education system and guiding it to excellence
- Teacher professionalism including professional capital
- Professional development – In-service education and training (INSET), continuous professional development (CPD), mentoring, and local professional communities of practice
- Education for sustainable development

Whilst a detailed comparison with, or analysis of, other education systems is outside the scope of this project, we have drawn on documented experiences from other countries and international agencies in formulating our conclusions and recommendations.

The following sections explore the literature, by theme as detailed above.

2.2   The Challenge of Providing a Good Quality Education System in Cambodia

During the Khmer Rouge rule in Cambodia from 1975 to 1979, 1.7 million Cambodians died, up to 90% of teachers were lost, and the education system was effectively dismantled (Ross & Library of Congress, 1990). Even today, only 55% of girls and 51.5% of boys stay in education long enough to reach secondary school (Cambodian Department of Education, Youth & Sport Management Information System, 2016). Drop-out rates are highest in rural areas, where 80% of Cambodians live (UNDP, 2016).

There have been several recent studies on the poor quality of teaching in Cambodia (Tandon & Fukao, 2015; Kelsall et al., 2016) which ranks amongst the lowest in the region (World Economic Forum, 2014, p. 16).

MoEYS (2016) reports that the two recent EGRA assessments raised "very serious concern on the quality of learning" and the EGMA assessment "showed further problems". It goes on to say that the Khmer and mathematics assessments at grades 3, 6 and 8 show "some worrisome results, indicating a low level of learning achievements in these subjects" (p. 84). The report analysis states that "findings of recent assessments suggest that even though access to primary school is relatively high, children are not learning sufficiently" (p. 7). Significantly, the report suggests that the failure to adequately build basic competency in the early grades means that difficulties have "accumulated considerably by the time [students] reach grade 6" (p. 7).

The World Bank study (Tandon & Fukao, 2015) contains a wealth of evidence from both primary and secondary sources that point to the need for improvements in the quality of teaching in Cambodia. The study details the following points in relation to the importance of the teacher's role in improving student learning:

1. Teachers, the largest element of Cambodia's education spending, are the most important determinant of school quality

2. Over a single school year, students with a poor teacher master 50 percent or less of the curriculum for that grade

3. Students with a good teacher achieve an average gain of one year

4. Students with great teachers advance 1.5 or more grade levels (Hanushek and Rivkin (2010) as cited in Tandon and Fukao, 2015)

5. A series of great or bad teachers over several years compounds these effects, leading to unbridgeable gaps in student learning

6. By upgrading its teaching force quality, Cambodia can substantially raise student achievement (Tandon & Fukao, 2015, p. 2)

According to the National Education for All 2015 Review (Royal Government of Cambodia, 2015) the main challenge is to develop an education environment where "each child is educated according to their age, aptitude and ability in order to create a highly skilled workforce" (p. 1). This highlights some pressing issues in the education system. Due to a lack of staff, Cambodian schools are characterised by large class sizes, sometimes of mixed grades, occupied by students of widely varying ages and aptitudes, exacerbated by high levels of student repetition in lower grades.

The ESP Mid-Term Review (MoEYS, 2016) states that "when other indicators beyond enrolment are analysed, particularly trends in dropout and completion rates, it becomes clear that retaining students in primary education is a challenge." The review further highlights the fact that the dropout rate in 2015 was "still more than double the target", with rural areas presenting a higher average dropout rate than urban areas (p. 28).

These findings demonstrate a lack of progress since a 2011 Overseas Development Institute (ODI), report (Engel & Rose, 2011) on basic education in Cambodia identifying that high rates of repetition and dropout result in an "inefficient use of resources" (p. 19). The report also identified a number of other challenges that continue to be issues today. Those that are relevant to this report are:

• Perceived lack of relevance of education at a community level

• Lack of autonomy for schools in the use of funds

• Heavily centralised education system

• Poor working conditions for teachers, low pay (now becoming less of an issue) and lack of opportunities for advancement

The current education reforms being undertaken in Cambodia focus on several of these challenges, and propose solutions which involve:

• Commitment to decentralizing the education system

• Giving more autonomy to the District Offices of Education

• Exploring ways teachers can be supported both in relation to their working conditions and pay (they have recently been provided with staged but significant pay rises, to be implemented over several years)

• Support with developing teachers' professional capabilities and opportunities for advancement

This is demonstrated by the introduction of the TPAP (Teacher Policy Action Plan) Task Force which has most recently developed teacher standards and a policy on Teacher Career Pathways. Both of these demonstrate a commitment by MoEYS to improve the quality of teaching, which in itself would inevitably impact on student outcomes and potentially the rates of grade repetition and dropout.

Implementation of these ideas however, remains a long way off. There is concern that there are not yet adequate lines of honest communication between the Ministry and the POEs / DOEs. Decentralisation for example, will not address the limited capacity that exists at Provincial and District levels. The ability amongst Provincial or District level staff to imple-

ment policies as developed at a National level, without a high level of guidance, support and oversight, remains limited. This view is reflected in the ESID working paper (Kelsall et al., 2016) entitled "The political economy of primary education reform in Cambodia" which states that "key implementing personnel face making considerable, often culturally confronting, changes to existing ways of working, often at or beyond the limit of their capabilities, for little obvious reward" (p. 31).

The Ministry is not unaware of these issues. The MoEYS 2016 Mid-term Review stated that one of the challenges to the process of decentralisation and de-concentration (D&D) is: "Limited capacities at individual, institutional, and organizational levels..... The process of D&D requires the development of specific capacities at sub-national level, and a successful implementation is conditional on building this capacity" (MoEYS, 2016, p. 87).

Improving communication and levels of support, within the process of decentralization, also needs to extend to the school and classroom level, in order to address the issue of improving the classroom teachers' professional capabilities. Roath (2012) reports that "There exists a significant gap between policy formation, implementation and monitoring within the educational system that does not target the specific problems which both educators (mathematics teachers) and children face" (p. 5).

The World Bank study (Tandon & Fukao, 2015) listed three key findings on the constraints to a high-quality teaching workforce in Cambodia, summarized as follows:

1. The best students are not attracted to teaching

2. Pre-service education is not delivering graduates with high content mastery or exposure to a student centred-learning environment

3. Teacher performance has been inhibited by ineffective incentives, an evaluation system that is disconnected from classroom realities, and a lack of opportunities to learn and share best-practice lessons with peers

The study concluded with three suggested policy 'pillars', summarised as follows:

1. Make teaching a more attractive profession through scholarships, incentives, competitive salaries, and high professional standards

2. Improve teacher preparation through rigorous mastery of content, student-centred pedagogy, and adherence to national teaching standards

3. Encourage stronger classroom practice through continuous professional development and peer-supported learning communities within and between schools

Prior to looking at what literature has to say on how the second and third of the World Bank's pillars (Tandon & Kukao, 2015) can be achieved (related to the quality of teaching), it is useful to first look at how 'quality teaching' is defined and measured, and its important impact on student learning outcomes.

2.3   Quality Teaching and its impact on Student Learning Outcomes

It has been widely evidenced that of all the factors that play a role in shaping a child's success, nothing matters at school as much as the quality of teaching (The Economist, 2016).

Hargreaves & Fullan, recognized globally as academic leaders in relation to educational change and professional capital in teaching, have consistently emphasised the vital importance of teacher quality and the need to continually develop teachers, claiming that "It is the teacher, and the quality of teaching, rather than standards, assessments, resources and leadership, that has the greatest impact on children's learning and achievement" (Hargreaves & Fullan, 2012, p. xii).

Alexander (2010) explores how 'quality' is measured in education. In examining the differences in approach to measuring quality in education between what he terms the 'supremacist view of world class education' and an 'education for development' view, Alexander argues that "both worldviews encounter acute difficulties in relation to what we mean by the quality of education". He argues that the notion of 'standards' often replaces the concept of 'quality'. Standards can be defined as outcomes and are testable, as opposed to processes which are experienced. He argues that whilst both quality and process are considered highly important in education for development, these development groups still "reduce quality to quantity in order that it can be indicated and measured" reducing the complexities of the educational process to a number of proxies, distorting which elements are defined as 'drivers of educational improvement'. He concludes: "We need

good system-level data, and inevitably it must be quantified for speedy analysis, but I do not think that in the development context we have yet solved the problem of how to quantify educational quality in a way which does justice to those aspects of pedagogy which really do make a difference – the quality of classroom interaction, for example" (p. 813).

However, as Alexander points out, some type of measurement of quality is inevitable, and MoEYS has begun the process of addressing the issue of measuring teacher quality and effectiveness, developing their Teacher Standards as a basis, and developing a Teacher Career Pathway that will be linked to the Teacher Standards. Whilst measuring teacher quality is universally problematic, developed nations have generally developed such standards and many link these to Career Pathways. One such example is the Australian education system, where the Australian Professional Standards for Teachers (APST, 2012) was published. The purpose of these standards is described by NSW Education Standards Authority (2017) as being "a public statement of what constitutes teacher quality. They define the work of teachers and make explicit the elements of high-quality, effective teaching in 21st-century schools that will improve educational outcomes for students" (p. 1). The framework groups seven standards across three domains of teaching - being knowledge, practice, and professional engagement - and makes clear the elements required within each of these domains across teachers' careers. Each standard has its own descriptors, and details what teachers are "expected to know and be able to do at four career stages: Graduate, Proficient, Highly Accomplished and Lead". They also provide descriptions of teachers' knowledge, practice and professional engagement as expected at each career stage.

These standards are used not only to assess a teacher's level of accomplishment, but also to assist the teacher to engage in self-reflection and self-assessment, giving them a framework by which to recognize their achievements and identify areas they still need to develop and seek support in. Finally, the standards can also be used as a model for professional accountability (p. 3). These standards are used to identify a teacher's level of proficiency, and those wishing to develop their career path are required to reach certain levels of proficiency as assessed against the Standards, in order to progress on a Career Pathway, in accordance with the levels of proficiency identified at each 'Career Stage'.

This example of a Teacher Standards framework is relevant when exploring options for the proposed Career Pathway initiative in Cambodia, in that it identifies universally accepted standards of 'quality' teaching. However, it is important of course that Teacher Standards and related Career Pathway frameworks take into account the local cultural context.

Following on from the concerns raised earlier about quality of teaching being 'measured', it is also worth noting that data around student attendance and retention is not necessarily a reliable measure of teaching quality. Research increasingly acknowledges that simply attending school does not necessarily equate with receiving a quality education. A recent UNICEF report suggests that every extra year of education a child receives, produces on average a 10% increase in their adult earnings, and furthermore, each additional year of schooling completed on average by young adults reduces a nation's poverty rate by 9%, with the poorest countries seeing the highest returns (UNICEF, 2016). However, World Bank's summary of their 'Education Strategy 2020' (2011) stated that "An abundance of evidence also shows that many children and youth in developing countries leave school without having learned much at all" (p. v), and explained that this is the reason for setting their goal as "Learning for All". This point is very significant in the context of 'quality teaching'. The purpose of teaching must be to achieve positive learning outcomes for students, not simply to impart poor quality teaching year on year which has little or no impact on the students' learning.

Unfortunately, The World Bank's summary in 2011 (quoted above) has become a reality, evidenced through the UIS's latest report (2017) referred to in both the Problem Statement and the introduction to this section. It identifies that 56% of primary school aged children and 61% of lower secondary aged adolescents worldwide, are not achieving minimum proficiency levels in reading and mathematics (p. 2), with 68% of these children and adolescents actually being in school (p. 10).

Whilst Cambodia has made great progress in achieving very high levels of enrolment in primary school, the issue of the quality of teaching that takes place in those schools is still cause for great concern. As stated in the UNESCO 2016 Global Education Monitoring report: "The lesson that has emerged over the past 15 years is that progress in education cannot rest solely on increasing enrolment. Education of good quality cultivates the flexible skills and competencies that prepare learners for diverse challenges" (p. 9).

Official primary school enrolment rates in Cambodia are relatively high ("In 2015/16, the total -public and private- net enrolment rate was 97.9 percent". (MoEYS, 2016, p. 6), representing significant achievements in providing access to schooling. However, "as a result of lack of access and poor retention, a significant number of children of basic education age are not attending school" (MoEYS, 2016, p. 7). Dropout rates are also high, such that by the time students progress to grade 7, the GER [Gross Enrolment Rate] is just 55 per cent and NER [Net Enrolment Rate – or children entering the grade at the correct age] is about 40 percent. (MoEYS, 2016, p. 6).

Banerjee, Jacob, and Kremer (2000); Hanushek and Woessmann (2008); Rivkin, Hanushek, and Kain (2005) as cited in World Bank (2017a) say "When poor parents perceive education to be of low quality, they are less willing to sacrifice to keep their children in school—a rational response, given the constraints they face" (p. 8).

2.4   Using evaluation and assessment data effectively

It is essential good quality data is available as a tool to improve the quality of education and the outcomes of students, by informing planning at both local and system levels. This view is espoused by the UIS (2017) which poses the question: "How can any government be expected to improve learning outcomes if they cannot assess the skills of their children?" (p. 22). The World Bank 2018 (2017a) report raises concerns that information systems in education are often weak and "are rarely used for decision making, planning, or implementation" (p. 203). This has been identified as a particular concern in the MoEYS (2016) Mid-term Review which states "A special note has to be made on the national learning assessment framework. Though there has been progress in the implementation of learning assessments, the mechanism to translate their findings for improving system performance are still not in place, for instance on teaching and learning processes, curriculum, inspection, training, etc. In addition, inspection activities and reports are not fully conducted and produced" (p. 9). The Review goes on to call on the education system to develop a "strong national assessment learning framework" (p. 9) and states later in the report that "In 2015, assessments for Khmer and mathematics were applied in a sample of schools to grade 3 students, but the results were not reported" (p. 37).

The World Bank (2017b) calls for a "commitment to implementing stronger learning assessments, using evidence of what works and what doesn't to guide education decision-making; and mobilizing a strong social movement to push for education changes that champion 'learning for all'". The World Bank 2018 report lists, as its first policy recommendation, that developing countries develop metrics to measure learning in primary and secondary school, including student assessment that can "help teachers guide students, improve system management, and focus society's attention on learning" (cited in World Bank, 2017b).

2.5   Formulating effective and contextually appropriate interventions

McKinsey & Company's report 'How the world's most improved school systems keep getting better' (Mourshed, et al., 2010), identifies a model for the development of an education system after examining 20 education systems around the world. It draws together common themes that are having profound impacts along the continuum of improving those education systems from 'Poor' to 'Excellent'. At the outset, the McKinsey report divides the 'Improvement Journey' for any education systems, into four stages as follows:

	STAGE	THEME
1.	Poor to Fair	Achieving the basics of literacy and numeracy
2.	Fair to Good	Getting the foundations in place
3.	Good to Great	Shaping the professional
4.	Great to Excellent	Improving through peers and innovation

(Extract from Mourshed et al., 2010, p. 28)

The McKinsey model is then made up from both interventions that are thematically consistent throughout the improvement journey; and those that are specific to, and particularly relevant at, each stage of the improvement journey. One of the key lessons from the analysis represented in the model, is that it draws out the seemingly obvious (but often forgotten) point that interventions need to be tailored to the differing needs for each stage on the journey.

Some of the major findings from the McKinsey research were that:

- Despite their different contexts, all of the school systems that were identified as improving, appeared to adopt a similar set of interventions;

- Whilst context is important, it is secondary to getting the fundamentals right; and

- Significant improvement can be achieved within "as little as" six years.

According to a report by the Curriculum and Leadership Journal (2012) "The McKinsey report does not suggest that continuous, sustained change in school systems is either quick or easy. On the contrary it requires dedicated leadership, commitment from educators and the implementation over time of a suite of research-based, proven interventions. It is a journey which once begun needs to be actively sustained, and one which is never over". This important point is reflected in the experiences of SeeBeyondBorders in the Quality Teaching program. Significant improvement in teaching quality and student outcomes have been achieved over a period of multiple years, during which time teachers have been trained, provided with regular professional development, mentored, assessed and supported.

According to Shuttleworth (2016a) "Given the constraints that currently exist within the Cambodian education system, significant emphasis is required on initiatives associated with what McKinsey describes as the first stage of improvement, and refers to as 'Achieving the basics of literacy and numeracy' (Mourshed et al., 2010 p. 28). During this stage, teachers require a good deal of hands-on assistance to ensure they are doing their best to teach children for the limited time that they are in school" (Shuttleworth, 2016a, p. 2). When identifying the priorities in relation to capacity development in Cambodia, Shuttleworth notes McKinsey's contention that "it is not until the third stage of the improvement journey for an education system (referred to as 'Shaping the Professional') that an initiative to 'raise the calibre of entering teachers and principals,' becomes an imperative, highlighting the need for there to be a functioning educational system already in place, into which more highly educated professionals can then enter and be nurtured" (p. 2).

It follows that in Cambodia, raising the calibre of new teacher trainees and new principals, is not the starting point, nor is it an initiative that many parts of the country are likely to be ready for at this point in time. Rather, this sequencing of initiatives underlines the importance of developing the existing schooling capacity in tandem with any initiative to develop the capability of new teachers and principals, which inevitably will be neither quick nor easy, as reinforced in the Curriculum and Leadership Journal (2012) cited earlier.

To be sustainable, any initiatives to reform and improve the education system need to be coordinated and aimed at changing behaviour and attitudes. What the McKinsey and Company researchers found, perhaps unsurprisingly, was that sustained improvement was about changing teacher culture so that not only was there emphasis on how and what teachers teach, but also on how they think about teaching. Change was supported by systems having processes in place to ensure long term continuity, comprising of three elements: strong pedagogy supported by collaborative practice; continuity of leadership and a mediating layer of professional support (Mourshed et al., 2010, p. 73).

An important factor when developing appropriate interventions to achieve a quality education system, is the need to be aware of the local context. The UNESCO Global Monitoring Report (2016) sums this up in the following way: "Local context and diversity shape both challenges and solutions. Rather than pushing individuals into a one size-fits-all programme, a lifelong learning approach incorporates diversity into an inclusive, equitable system. Education for sustainability reaches out to serve marginalized communities by using all types of education, matching learning to context" (p. 9). This reinforces the McKinsey report's point (Mourshed et al., 2010) that context is important, while not taking away from the fact that getting the fundamentals right is the priority and education systems may all show similar (contextually appropriate) interventions at a given stage in the improvement journey.

A final point when considering local context is the problem of a shortage of well qualified teachers, particularly in poor rural areas. Many schools in these areas still have under- or unqualified teachers. According to OECD (2010), "The quality of an education system cannot exceed the quality of its teachers and principals, since student learning is ultimately the product of what goes on in classrooms" (p. 4). This quotation was also used in the McKinsey report and is quoted frequently in educational development papers in relation to achieving quality education. However, Husbands (2013) explored this idea in some detail in his article "Great teachers or great teaching? Why McKinsey got it wrong". Husbands argues, that if you focus on the teacher being the important factor - rather than teaching - then the focus is on 'people'. According to Husbands, "Changing teaching by changing teachers is a long, slow slog". Similarly, he argues that sacking weak teachers and recruiting only the 'brightest and the best' are "very, very slow routes to improving the quality of an education system.... It took Finland more than 30 years for recruitment practices to re-shape the profession.... If on the other hand you focus on teaching as the important factor, then according to Husbands, "you get a different set of policies". In a country where it is not possible to employ only the brightest and the best people (or to 'performance-manage' less able teachers out of the system, replacing them with better skilled teachers), it is important to focus on the teaching - working with every teacher in every school to improve the quality of their teaching and this needs to be a continuous process. In this scenario, Husbands argues that it is important to focus on "what drives really good teaching – committed teachers and high quality instruction, which itself depends on rigorous subject knowledge and knowledge of effective pedagogy, both leavened by imagination" (p. 1).

We concur that Husbands (2013) makes a good point, but not one that warrants the suggestion that McKinsey "got it wrong" as their report does not focus on the teachers that come into the system, until stage three out of four on what the report calls the 'improvement journey'. Improving the teaching is the focus throughout the journey starting right at the beginning of stage one.

We believe that at this point on the improvement journey for Cambodian education, rather than seeking to impose systemic teacher development models that have been used in foreign contexts, MoEYS needs to introduce contextually appropriate interventions that will improve the teaching workforce that they have in place now in Cambodia. In particular, this should be conducted by building the content knowledge of current teachers; their understanding of building students' knowledge sequentially; and their pedagogical skills, through explicit and systematic training programs, while also providing teachers with ongoing professional learning opportunities relevant to their individual needs, and providing teachers with in-class mentoring.

2.6 Teacher professionalism

2.6.1 Context

Teacher training has moved from allowing a person who has completed Grade 4, to teach in Grade 3, to be a profession that requires two years of teacher training following twelve years of general education. However, teaching quality remains at a foundational level, and a seemingly intransigent problem.

Hargreaves (2000) described four broad historical phases in the evolution of teachers' professionalism and professional learning. Hargreaves describes these as 'ages' historically experienced within Anglophone nations.

The following is a summary of Hargreaves' 'ages' and focuses on the first three ages, those relevant to the current Cambodian context:

1. **Pre-professional age** refers to the period where teaching was technically simple, where the teacher learnt through apprenticeship and trial and error. The classroom was teacher dominated, to ensure control, with little or no teacher-student interaction. Teachers received little training or ongoing professional learning.

2. The **autonomous professional** age welcomed a higher status for teachers. Characterised by curriculum and pedagogical innovations, teachers had more professional discretion and job security. Although professional development courses are available, teachers struggle to apply their learnings in the class due to a lack of structural support. This age is also marked by teacher individualism, where limited interaction with other teachers "tends to be around materials, discipline, and individual student problems rather than about curriculum goals, teaching behaviour, or classroom learning (Lortie, 1975; Little, 1990)" (Hargreaves, 2000, p. 160).

3. The **collegial professional** age is where the "increased complexities of schooling challenge the sustainability of individual teacher autonomy". This age is characterised by greater teacher collaboration within professional learning communities. Teachers in this age collaborate in order to cope with the complexities, valuing risk-taking and continuous improvement. They work with each other to identify and resolve problems and employ self-reflection. They "engage in research, link theory to practise, and partner with educational stakeholders beyond their own classrooms. Teacher collegiality, while apparent, is authentic and well supported, and not contrived and imposed". (Summary of Hargreaves (2000), p. 153 – 166)

According to Hargreaves (2000), "Pre-professional images of teaching continue to be dominant in many East Asian countries, partly because of the constraints of class sizes and other factors mentioned earlier, but also because of the cultural importance of Confucian conceptions of teaching and authority within schools and families"(p. 157). He identifies that only in the Second and Third 'ages' does professional learning begin to be relevant.

Hargreaves' (2000) comments on 'pre-professional age attitudes' to education are highly relevant in a Cambodian context, in relation to perceptions about the form professional learning should take: "In [the] pre-professional [age], teaching was technically simple. Schools where teachers continue to believe teaching is basically easy, where the pre-professional view persists, are ones that Rosen-Holtz (1989) has described as `learning impoverished' (p. 155)…If the task of teaching is seen as basically simple, why do we need to invest in continuous professional learning beyond a few in-service sessions connected to the government's latest policies?" (p. 157).

Tan and Ng (2012) study: "A critical reflection of teacher professionalism in Cambodia" concluded that teacher professionalism in Cambodia is a hybrid of Hargreaves' 'pre-professional' (1st age) and the 'autonomous professional' (2nd age), given there is now some formal structure in Cambodia to teacher training and professional learning (p. 128).

Despite progressing towards 'autonomous professionals' however, Tan and Ng (2012) identify "less desirable aspects of the autonomous professionals...detectable in Cambodia". They observe that the education system's innovations "are not implemented in the classroom due to a lack of structural support...(and) contextual restraints...such as large class sizes, limited infrastructure and resources, and lack of support from school leaders and colleagues" which they conclude inevitably leads to "low learning achievements of the children" (p. 4). They also observe that teachers do not take initiative to collaborate, apart from attending compulsory monthly technical meetings, and teacher collegiality is therefore "contrived rather than authentic and well-supported". In addition, Tan and Ng point out that a particular element of the pre-professional age still dominates – that of teaching that is "still content- and teacher-dominated due to the teachers' over-riding concern for discipline and order in the classroom and their confidence in the tried-and-tested teacher-centred teaching" (p. 5).

Given the situation identified in the research, the schools we studied appear to be in the stage that requires the focus to be on the achievement of the basics of literacy and numeracy or what UNESCO terms "Minimum Proficiency Levels" (UNESCO, 2017). The McKinsey Model (Mourshed, et al., 2010) identifies this as stage 1 "Poor to Fair". The interventions identified for this stage in McKinsey's model are the most relevant for Cambodia at this point in the system's improvement journey. Recognition of the contextual realities on the ground in Cambodia is crucial to designing appropriate interventions to have the greatest impact in the long term. Acknowledging the current status and focussing on re-building the system at a foundational level will reap its rewards early on and ensure the sustainability of the intervention strategies. This is discussed further in the recommendations section of our report.

2.6.2 Professional Capital

Hargreaves and Fullan, who have long prioritised the importance of the quality of teaching in relation to children's learning, have extended their research more recently into an exploration of professional capital and the role of professional development in ensuring quality teaching and improved student outcomes. This research by Hargreaves & Fullan (2013) found that "Professional capital has a fundamental connection to transforming teaching every day", citing "many examples of this (seen) in schools and school systems around the world" (p. 36). Professional capital is comprised of three kinds of capital: human capital, which refers to the talent of individuals; social capital, which refers to the transformative power of working collaboratively in a group; and decisional capital, which refers to "the wisdom and expertise to make sound judgments about learners that are cultivated over many years" (p. 36). Their research focuses on their belief that if systems invest in building professional capital, it will lead to "rewards of economic productivity and social cohesion in the next generation" (p. 37). This idea is discussed in more detail later in the Literature Review, Section 3.8: "Building local professional communities of practice".

2.7 Professional Development

The World Bank (2017a) citing: Popova, Evans, and Arancibia (2016); Walter and Briggs (2012); Darling-Hammond and others (2009); and Yoon and others (2007). says "Experience from high income countries shows that practicality, specificity, and continuity are key to effective teacher professional development. Practicality means teachers are trained using concrete methods as opposed to theoretical constructs, and the training is classroom-based. 'Specificity' means teacher training programs are most effective when they teach pedagogy specific to a subject area (say, how to effectively teach a mathematics class). Continuity means teachers receive significant continual support—not one-off workshops" (p. 132).

2.7.1 Approaches

Timperley, cited in Muijs (2014), explores the important distinction between professional *development* and professional *learning*, observing that "over time, the term 'professional development' has taken on connotations of delivery of some kind of information to teachers in order to influence their practice. 'Professional learning' implies an internal process in which individuals create professional knowledge through interaction with this information in a way that challenges previous assumptions and creates new meanings. Professional learning requires teachers to be seriously engaged in their learning whereas professional development is merely participation" (p. 22). This distinction is particularly relevant in relation to the type of professional development provided to teachers in Cambodia, where there has long been a tradition of providing 'one–size-fits-all' workshops, with little or no research done into the professional learning needs of the teachers as relevant to their own particular schools or districts. In addition, there is little or no attempt to provide any support to

teachers to implement in their own schools, the strategies they learn at workshops.

The Cambodian Government's report on the national assessments (Roath, 2012) concluded that attention needed to be given to improving the quality of mathematics teaching, particularly in the first three grades, through: teacher training to improve their knowledge, pedagogy, and methodology; curriculum development – making the mathematics content more relevant to the students' daily lives; and provision of relevant resources (p. 6).

According to research conducted by Knight et al., (2015) "Teacher educators and researchers agree that externally driven, isolated workshops and conferences have produced little impact on in-service teacher learning and change (Gallimore, Er-neling, Saunders, & Goldenberg, 2009; Hawley & Valli, 1999). In contrast, when professional development is school-based and embedded in the daily work of teachers, learning is more likely to occur (Desimone, 2009; Garet, Porter, Desimone, Birman, & Yoon, 2001). Teacher education rooted solely in university coursework has minimal impact on pre-service teacher (PST) learning. Where school-based approaches have been extended to PST learning with an increased focus on field experience, they have been seen as a valuable element of PST education (American Association of Colleges of Teacher Education [AACTE], 2010)" (p. 301).

2.7.2 Teacher Professional Development Practice

In a 2015 report by Burns and Lawrie on the need for quality teaching and quality professional development in poor and crisis-affected contexts, the authors draw attention to the fact that it is these very contexts where the need for quality professional development is the greatest. They report that often in such contexts, teachers rather than the professional development systems themselves, are blamed for the teacher's failure to effectively implement learnings they have re-ceived in training sessions, despite the fact that often the professional development is "episodic, its model uniform, its quality variable, its duration limited, and support or follow-up for teachers almost non-existent" (p. 7).

According to Burns and Lawrie (2015), "There is increasing awareness that teachers, like all professionals, must be careful-ly recruited and prepared to be teachers, and developed professionally throughout the course of their careers in order to be effective. In many parts of the globe, nations, districts and schools are beginning to move away from the poor professional development practices … toward what we know is effective professional development – school-based teacher learning, dif-ferentiated teacher professional development, greater school-based support for teachers and teacher collaboration" (p. 8).

In the same report, Burns and Lawrie (2015, p. 11) cite the Teacher Professional Development in Crisis online forum's seven major recommendations as follows:

Recommendation 1	Focus on teachers in fragile contexts – as professionals, learners and individuals
Recommendation 2	Develop, apply, measure and institutionalize standards for teacher professional development
Recommendation 3	Create professional development opportunities that promote teacher collaboration
Recommendation 4	Provide teachers with ongoing support
Recommendation 5	Invest in high-quality teacher educators
Recommendation 6	Build instructional leadership at all levels of the educational system
Recommendation 7	Use ICT to provide access to content, professional development and professional learning communities

These recommendations correlate directly with those set out in Section 7.2 and in Table 8 at Section 7.4 which are based on the McKinsey Model (Mourshed, et al, 2010) and form the basis of our recommended QTLS interventions in a Cambodian context.

These recommendations stand in marked contrast to the findings in "Improving Teacher Quality – Maximising Returns on Investment in Teacher Education in Cambodia" (Prigent, 2016), which reports that "[we] have found little evidence to corroborate stakeholders' views that in-service teacher training can actually improve the quality of education at the school level… [and this] lack of empirical evidence creates important doubts about the wisdom of continued government and donor investment in in-service training at least in its present form" (p. 59) (our emphasis).

According to Shuttleworth (2016b), "INSET is without doubt difficult to develop and implement effectively, as is any in-itiative aimed at changing human behaviour. Current research however, warns of simplistic assumptions and processes, and suggests it is attention to detail and persistence that is required to change behaviour, improve teacher quality and

improve learning outcomes" (p. 3). Prigent's (2016) particular value is in its description of the "Cascade Model" (p. 44) and its identification of the many flaws it contains. That training based on the cascade model could sustainably impact teaching quality has been roundly discredited.

Fullan & Hargreaves (2016) in their paper "Call to Action – Bringing the profession back in" (2016) first discussed in Section 2.6.2, describe how the process of professional learning and development "is at the heart of an effective and continuously growing teaching profession" (p. 2).

Sentosa & Arlianti (2015) explore a 'whole school development' approach to in-service teacher professional development that was the focus of the PRIORITAS project, a USAID funded basic education project in Indonesia (2012-2017). The whole school development approach involved training and regular school cluster meetings. The training introduced practical strategies for introducing student-centred teaching and learning.

The paper addresses the issue of ensuring that graduates are well equipped to teach effectively once they enter schools on graduation, and therefore the importance of linking PRESET training to in-service professional development, with an emphasis on practice. 'Good practice schools' were used as hubs to model good practice in effective teaching, school based management and community participation. This aimed to ensure the sustainability of good practice at a local level. In addition, the program trained mentors from the teacher training institutes to provide on-site mentoring in schools. The paper reported that "These 'mentoring' activities are crucial in achieving real impact at the school level and are training teachers and principals to think critically about what they are doing rather than blindly implementing what an 'expert' tells them to do" (p. 5).

2.7.3 Mentoring

The importance of modelling good practice for teachers and then providing mentoring to ensure new techniques are employed in the classroom following training, is recognized as crucial by SeeBeyondBorders and forms an important element of the Quality Teaching Program. Classroom observations and teacher interviews conducted as part of this research project confirmed that teachers and principals recognize that they require this type of support in their day to day teaching.

USAID (2016) in its Situation analysis and discussion on Cambodia's Education Assessment and Quality Assurance Systems, drew attention to the absence of a mentor program in Cambodia. They presented an analysis of MoEYS's programs of student assessment and quality assurance, compared against "an optimal framework drawn from a 'theory of change' articulated by RTI (2015)" (p. 1). The review of MoEYS's "whole school quality improvement" program concluded that it was "a comprehensive program for both tracking school performance and identifying factors that need improvement and ways of doing so. The only element missing in the Cambodian framework, compared to the optimal one, is a 'regular system of in-class observation and mentoring of teachers', which many countries have found to be crucial" (p. 1).

The USAID (2016) review found that student improvement had only been 'modest', particularly in literacy (mathematics was more difficult to gauge since EGMA has only just been introduced after a hiatus of a five or six years). The review suggests that this also was potentially related to: "the lack of a good teacher mentoring program, among other things" (p. 6).

The World Bank 2018 report (2017a) provides numerous examples of mentoring programs in developing countries which have been shown to have significant impact on teacher practice, ensuring that teaching skills can have a positive effect on student learning. In their 2017 Press release, the World Bank emphasises the need for systems to "Attract great people into teaching and keep them motivated by tailoring teacher training that is reinforced by mentors" (World Bank, 2017b).

MoEYS has released a policy on Continuous Professional Development for Education Staff which was published by MoEYS in August 2017. It states that, "This Policy on Continuous Professional Development for Education Staff has the aim of preparing education staff to have sufficient attributes and potential to fulfil their work over the course

of their career, making effective use of curricula, coaching/mentoring, in-service training, and professional development programmes for all education staff" (p. 4). The document also states "District Offices of Education, Youth and Sports: all levels of educational foundations of the municipal and district training and monitoring teams (DTMTs) are responsible for the implementation of on-site in-service training and work on coaching/mentoring" (p. 7). This is a positive step as it supports the importance of the mentoring concept but it is short on detail and the implementation plan is currently in process.

2.8 Building local professional communities of practice

Further to their research into the concept of professional capital, Fullan and Hargreaves have conducted extensive research into professional learning and development (PLD) and in 2016 published "Call to Action – Bringing the profession

back in" (see Section 2.6.2). In this paper, (Fullan & Hargreaves, 2016) they describe PLD as being *"the essence of the idea and strategy of professional capital — that is, if you want a return, you have to make an investment"* (p. 1). The paper highlights the fact that teachers need to be developed in terms of knowledge and skills; that these qualities need to be "deliberately improved over time" by providing structured experiences and continuous experienced support; and that the knowledge needs to be circulated as part of a "shared commitment to and engagement in all students' success" (p. 3). A belief in the vital importance of PLD prompted their 'call to action', and they stressed the following points:

1. PLD is at the heart of an effective and continuously growing teaching profession

2. Effective PLD is rooted firmly in a system culture of collaborative professionalism that cultivates individual and collective efficacy

3. Enhancing the role of teachers individually and collectively in the development of good practice must be deeply rooted in a learning culture (Fullan & Hargreaves, 2016, p. 2)

As discussed earlier, Tandon & Fukao (2015) also identified, as one of their policy pillars, the need to encourage stronger classroom practice through continuous professional development and peer-supported learning communities within and between schools.

The McKinsey report (Mourshed et al., 2010) (discussed in Section 2.5), describes an education system intervention process that supports the improvement journey at each stage. Such an intervention process is underpinned by a systematic approach to professional learning and development, firmly rooted in a commitment to promoting professional collaboration. This should form the essence of a new CPD/PLD program for Cambodian teachers, supported through a strong mentoring system and supportive leadership from district, provincial and ministerial education authorities.

An intervention model of creating professional communities of good practise that will be self-sustaining and collaborative, and that will improve the quality of learning in schools, particularly in rural areas, was put forward by SeeBeyondBorders in the paper "Teacher Capacity Development in the context of Whole System Reform for Cambodia" (Shuttleworth, 2016a).

2.9   Education for Sustainable Development (ESD)

While there has been a good deal of discussion about ESD, there remains some confusion over whether this refers simply to teaching sustainable practices – such as the damaging effect of plastics on the environment – or something deeper that actually propels development itself. In discussing the importance of the Sustainable Development Goals, UNESCO (n.d.) states: "There is growing international recognition of ESD as an integral element of quality education and a key enabler for sustainable development".

Through our research project, we gained a deeper appreciation of the role that ESD should play in relation to educating teachers effectively, to ensure that the standard of education in Cambodian schools is both of a high quality and leads to sustainable development within the country. ESD needs to extend beyond including sustainability 'topics' into the school curriculum. It needs to extend to the way that we train teachers. It is important that training of teachers incorporates elements that address their responsibilities and value as teachers, their attitudes to their work, and an understanding that they have a responsibility to provide quality teaching, to impact on their students' futures, and in turn to impact the sustainability of their country's development. This is borne out by UNESCO's vision for ESD (as cited in UNESCO, 2009) of:

"A world in which the values inherent in sustainable development are integrated into all aspects of learning in order to encourage changes in behaviour that allow for a more sustainable, economically viable and just society for all, a world where everyone has the opportunity to benefit from education and learn the values, behaviour and lifestyles required for a sustainable future and for positive societal transformation".

The United Nations (n.d.) online factsheet on Sustainable Development Agenda states: "When people are able to get quality education they can break from the cycle of poverty. Education therefore helps to reduce inequalities and to reach gender equality. It also empowers people everywhere to live more healthy and sustainable lives. Education is also crucial to fostering tolerance between people and contributes to more peaceful societies". The purpose of the SDGs is further explained, as "built on the success of the Millennium Development Goals (MDGs) to go further to end all forms of poverty" and "recognize that poverty must go hand-in-hand with strategies that build economic growth and address a range of social needs including education" (UN, n.d.).

The Centre for Global Development (n.d) also states that "education gives people the skills they need to help themselves

out of poverty and into prosperity" citing in particular the impact a quality education has in relation to: i) Improved health – people are "better prepared to prevent disease and to use health services effectively", with the added benefit that "educated mothers have healthier children"; ii) Higher wages and economic growth – higher wage earners contribute to national economic growth; and iii) Democracy and political stability as educated people are able to "learn about their rights and acquire the skills and knowledge necessary to exercise them" (p. 1).

The promotion of education as a vital investment, was reflected in the article "No Education, No Development" (written by Norway's Prime Minister Solberg and Brende, Minister of Foreign Affairs prior to hosting world leaders at the 2015 Oslo Summit on Education for Development and in relation to the UN's Sustainable Development Goals). The purpose of the summit was to "develop strategies for mobilizing political support for increasing financing for education". The article claimed: "For both countries and individuals, there is a direct and indisputable link between access to quality education and economic and social development" (Solberg & Brende, 2015).

The Royal Government of Cambodia's Education for all 2015 review also recognizes and identifies the importance of high quality learning in relation to the sustainable development of the country: "The objectives of enhancing the quality and relevance of learning are to ensure that all children and young people have a relevant, high quality learning experience which enables them to contribute effectively to the growth of the Nation" (p. 2).

The implications of an education system that has teaching of a high quality are reinforced in the UNESCO (2016) Global Education Monitoring report: "The focus on quality ensures that foundation skills – literacy and numeracy – foster additional higher order thinking, creativity, problem solving, and social and emotional skills" (p. 9). These implications are highly relevant in Cambodia, where teaching has tended to take a 'one size fits all' approach, and where problem solving, creativity and higher order thinking skills are not part of a learning culture that is dominated by rote learning. It is vital to the growth of human capital that these skills are developed through quality teaching programs.

3 Research Methodology

3.1 Research Design

The research component of this report was undertaken in June 2017 in Bavel and Thmor Kol districts in Battambang Province, in a selection of primary schools facing a variety of challenges, including accessibility, poverty, teacher and/or resource shortages, and poor teacher motivation.

The aim of this research was to provide a comprehensive review of the quality of early grade mathematics teaching in primary schools. It utilised quantitative and qualitative data collected from a variety of sources to triangulate and corroborate key findings, and balance the relative strengths and weaknesses between the different approaches adopted to the research.

Information was gathered from teachers, from their students, and from those responsible for managing teacher quality, including principals, school support committees (SSC) and education authorities.

3.2 District, School, Teacher and Student Selection

SeeBeyondBorders met with the Battambang POE to introduce the research project and to request assistance in identifying districts that would benefit from a future initiative focusing on teaching quality. Criteria for selection included: that the district should be in a rural area; that there would be few or no other NGOs working in the district at the time, to avoid dilution of focus; and that there were sufficient qualified teachers to make the research, and any subsequent intervention, feasible.

After discussion and consideration, the POE and SeeBeyondBorders agreed on Bavel and Thmor Kol as the research districts. Individual schools were selected to represent a cross-section of schools in each district - schools situated in communes or small towns (30%), in semi-rural areas (35%) and in relatively remote rural/farming areas (35%).

There are 76 government primary schools in Bavel District, organised into 16 clusters. A total of 386 qualified teachers (196 female) work in these schools as classroom teachers and principals, as well as 130 contract (unqualified) teachers. Thmor Kol District has 46 primary schools, and employs 798 qualified teachers (422 female) and 32 contract[1] (unqualified) teachers. Of these teachers there are 576 who work in grades 1, 2 and 3; 312 in Bavel and 255 in Thmor Kol.

Twenty schools (10 in each district) were involved in the research, and 1,001 grades 1, 2 and 3 students were tested. There were 35 students (6 female) in the target schools identified as having a disability, however we are unable to determine how many of them were included amongst our participants as we did not ask for them to be singled out.

Fifty eight teachers were observed in the classroom (two teachers taught two classes), interviewed, and tested in written tests. At the same time, interviews were conducted with 20 school principals and SSC members, two DOE and DTMT representatives, and the Deputy Director of Battambang Provincial Office of Education (POE).

Graph 1. Researched Teachers' Years of Classroom Teaching Experience

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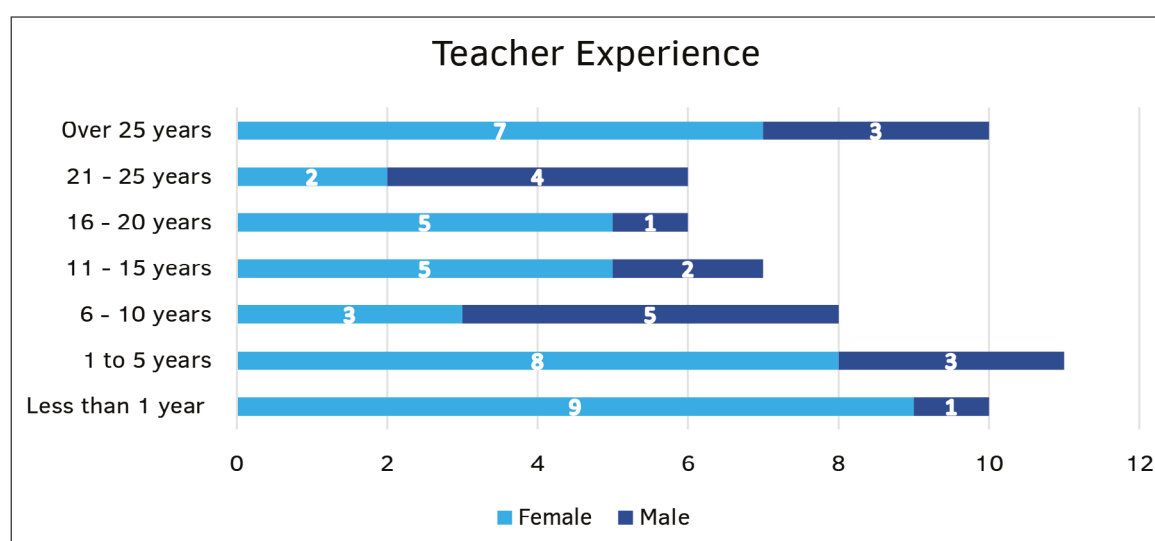
[1] It is likely that there are less contract teachers in Thmor Kol because it is nearer to Battambang town and therefore a more appealing place to work.

SeeBeyondBorders

Table 1: Bavel District School Selection

School	Schools in commune centre or small town	Schools in semi-rural area	Schools in rural area	Sufficient qualified grades 1-3 teachers	NGOs supporting with teacher skills
Kdol Leur		X		✓	Nil
Oudounpov			X	✓	Nil
Spreankondoul	X			✓	Nil
PreySangha		X		✓	Nil
Beong Somrong			X	✓	Nil
Dangkor Pein		X		✓	Nil
Makkleur		X		✓	Nil
Phum Preykapos		X		✓	Nil
Kompong Chnang			X	✓	Nil
Ampil Bramderm	X			✓	Nil

Table 2: Thmor Kol District School Selection

School	Schools in commune centre or small town	Schools in semi-rural area	Schools in rural area	Sufficient qualified grades 1-3 teachers	NGOs supporting teacher skills
Ang			X	✓	Nil
Tamek Chhror Nean		X		✓	Nil
Phum Thmey	X			✓	Nil
Phum Spean	X			✓	Nil
Roung Chrey		X		✓	Nil
Ou Nhor	X			✓	Nil
Thoul Thngarn			X	✓	Nil
Khum Chrey	X			✓	Nil
Phum Chrey			X	✓	Nil
Thoul Prekei			X	✓	Nil

3.3   Data Collection

To deal with the scale of data collection and data entry required for this project, the lead researchers recruited and trained five university students to assist. The students were trained alongside SeeBeyondBorders staff in standards and techniques, and exactly the same standards were required of everyone involved. In one full day of training, the researchers covered topics including professional working conduct with teachers, child protection, research tools, data collection procedures, data validation procedures and the process required to select the sample students for testing.

The following table provides an outline of the information collected, how that was done and by whom.

Table 3: Data Collection Summary by Stakeholder

Stakeholder	Data collection methodology	Sampling methodology	Number of	Details
Teachers[2]	Classroom observation with checklist	Systematic sampling [3]	58	SeeBeyondBorders Mentor Development Coordinators conducted observations in 3 classes (grades 1-3) per school (45-minute lesson) NB 2 multi-grade classes included
Teachers	Mathematics testing (grades 1-3 concepts)	Systematic sampling	58	Administered by university students, supervised by SeeBeyondBorders staff 45-minute test under exam conditions
Teachers	Questionnaire based interview	Random selection	58	Face-to-face interviews by SeeBeyondBorders staff
Students	Student mathematics test	Systematic sampling	1001	17 students selected per class. 45-minute tests administered by university students under examination conditions
School Principal	Questionnaire based interview	100%	20	Face-to-face interviews by SeeBeyondBorders staff
SSC Leader	Questionnaire based interview	100%	20	Face-to-face interviews by SeeBeyondBorders staff
DTMT Leader	Questionnaire based interview	100%	2	Face-to-face interviews by SeeBeyondBorders staff
DOE Director or Deputy	Questionnaire based interview	100%	2	Face-to-face interviews by SeeBeyondBorders staff
POE Deputy Director	Questionnaire based interview	100%	1	Face-to-face interview by SeeBeyondBorders staff

Table 4: Percentage of teachers selected

Grades 1,2 & 3 teachers	Bavel	Thmor Kol	Total
Total	312	255	567
Selected	30	28	58
% age	10%	11%	10%

The POE provided letters of support that were sent to the Director of DOE and school principals in both districts, requesting their cooperation with the research. SeeBeyondBorders then met with DOE to introduce the research project and to discuss the school selection process. The field research phase (testing, classroom observation and interviews) was completed over 16 days in June 2017.

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[2] The same teachers participated in all data collection stages – testing, classroom observations and interviews

[3] Explanation of the Systematic Sampling method: http://www.investopedia.com/terms/s/systematic-sampling.asp

3.4 Testing of Student Knowledge and Understanding

The aim of student testing was to measure knowledge against relevant mathematics concepts in the MoEYS' curriculum. The test was designed by the SeeBeyondBorders education team (and approved by the Battambang POE) and posed questions appropriate for each grade level and in line with the Cambodian syllabus document.

The test was conducted with 1,001 students from 60 classes in 20 schools (two teachers taught two classes). Approximately 17 students were randomly selected by SeeBeyondBorders (without the involvement of the teachers) to sit the test. In one small class, all 15 students completed the test. Students in larger classes were selected by systematic sampling, according to a random starting point and a fixed periodic (or skip) interval. Researchers had no prior knowledge of the educational ability of the students, their attendance at school, or any other factors that may contribute to their success or failure in the knowledge test.

The university students gave an explanation of the exercise to each group of students before the test began. Each student had 45 minutes to complete the test under examination conditions. The university students acted as invigilators who ensured no textbooks or notes were used and there were no opportunities for students to collude. Test papers were collected by the invigilator at the end of each test and immediately returned to the research office for marking and analysis. University students marked the tests, and all marking was done under the direct supervision of SeeBeyondBorders Education Technical Program Manager at SeeBeyondBorders' head office in Battambang.

3.5 Data Collection from Teachers

The 58 teachers in 20 primary schools participated in all three elements of the teacher research – mathematical knowledge tests, mathematical teaching skills and interviews. The research group comprised 20 men and 38 women and their qualifications ranged from bachelor degree (8 teachers) to grade 7 level schooling (3 teachers). The same teachers took part in all three elements of the research.

3.5.1 Primary School Teacher Mathematical Knowledge Tests

This test was designed to test teacher knowledge of the early grade (grades 1-3) mathematics curriculum: concepts teachers need to know and understand in order to teach effectively. The test was designed by the SeeBeyondBorders education team and approved by Battambang POE.

The written test comprised 31 questions, including calculations and mathematics problems, and 45 minutes was allowed for teachers to complete it. Tests were administered by the university students under examination conditions, and supervised by SeeBeyondBorders' staff.

3.5.2 Mathematical Teaching Skills of Primary School Teachers

Effective, quality teaching in a mathematics class requires that the teacher is aware of the importance of building the students' conceptual understanding, as well as teaching procedural fluency. In this research project, we sought to collect and explore data in relation to whether teachers demonstrated conceptual understanding in addition to procedural fluency and whether they demonstrated skills and strategies which would lead to long term sustainable outcomes for students by building the foundations as described by MoEYS (2016) and discussed further in the text box below (See next page).

Teacher observation was designed to measure teacher performance against good teaching practices expected from qualified early grade teachers (grades 1-3). The observation checklist assessed each teachers' level of competence in six teaching skills: lesson planning; use of a variety of teaching activities; use of teaching resources; capacity to support different learners; questioning techniques and classroom management. The observation form was designed by the SeeBeyondBorders education team (based on SeeBeyondBorders' methodology) with support from the Education Program Director. It was then approved for use by Battambang POE.

In larger schools, SeeBeyondBorders' staff selected the teachers for observations through simple random selection and with no input to the selection process by any school staff. In smaller schools with only one class at each grade level, observations were conducted in all classrooms.

During the observations, SeeBeyondBorders' staff (Mentor Development Coordinators) sat unobtrusively at the back of the classroom and observed the whole mathematics lesson (45 minutes), using a standard checklist to record observations of performance in each of the skill areas. Teachers were not provided with any advance notice they were to be observed and researchers did not provide any feedback or in any way interfere with the teachers in the conduct of their lessons.

Background to assessing the quality of teaching in a mathematics classroom

Effective, quality teaching in a mathematics class requires that the teacher is aware of the importance of building the students' conceptual understanding, as well as teaching procedural fluency. For example, grade 3 students who have gained no conceptual understanding of how the base ten number system 'works' and have not been introduced to how a place value chart 'works' will find it difficult to gain a confident understanding of how to 'trade' when doing subtraction involving three-digit numbers.

Observation of teaching practice in Cambodia reveals an emphasis on procedural fluency and a reliance on rote learning to teach the processes and procedures involved. This suggests that Cambodian teachers are unfamiliar with the need to build students' understanding of a concept sequentially, or have no knowledge of how this might be done. In our experience (and we sought to ascertain if that was true in the schools observed in this project) Cambodian teachers demonstrate limited conceptual understanding of mathematics. They appear to have been taught to have procedural fluency but have little experience in looking at the 'How?" "Why?" and "What if..?" type questions in relation to mathematics.

Teachers therefore need to be given opportunities to explore mathematics in a different way, and be taught explicitly how to build students' knowledge of concepts, working gradually from a concrete to an abstract understanding. There are several factors which contribute to positive outcomes for students in a mathematics class, and they relate to this idea of building knowledge by developing conceptual understanding. This is highlighted in the MoEYS 2016 Mid-term review which raised concerns as to "the quality of basic education and actual learning in schools" stating that "[because] learning difficulties show from an early age, quality strengthening measures should also be set up from an early stage... The reinforcement of reading, writing, and math skills in the first grades of Primary school are foundations for later learning' (p. 8). This is further reinforced by Dougherty (2013) who states that "Students who do not have a good start usually do not thrive later on" claiming that this is partly because "early learning itself facilitates later learning—students who already know more about a topic often have an easier time learning additional information on the same topic, and early exposure to knowledge can stimulate students to want to learn more". Dougherty goes on to say that learning takes time, and is cumulative, meaning that that teachers need to build on students' prior knowledge and learning from the early years in order to be effective.

When assessing the quality and effectiveness of teaching in the selected classes, it was important to explore the context of the lesson:

- What concept is being taught?

- Is the lesson well planned with clear learning objectives?

- What prior knowledge would the students need in order to understand the concepts being addressed?

- Is the lesson objective appropriate to the current understanding of the students?

It was also important to observe the teaching strategies and skills employed by the teacher:

- Does the teacher use an introductory activity to elicit students' current understanding (or misconceptions) of a concept?

- Would this lesson require or benefit from the use of concrete resources for the students to manipulate and gain a better understanding of the concept?

- Does the teacher promote and encourage purposeful mathematical conversations between herself and the students, and amongst the students themselves?

- Does the teacher identify students who may need additional support and provide relevant and effective support to them?

- Does the teacher show good classroom and resource management skills?

The areas detailed above were specifically targeted through the in-class observations undertaken as part of the research, and recorded on the observation forms used by the researchers. All the researchers who performed the in-class observations are teachers themselves and have a proven track record in teaching these skills and strategies, and are therefore able to identify successful implementation (or lack of) in a classroom setting. University students did not take part in this aspect of the data collection.

Observers did identify that they displayed some inevitable signs of nervousness which might have either enhanced or restricted their performances.

3.5.3 Identifying Teacher Challenges

The aim of the interviews was to gather information about the teacher's experiences and challenges, perceptions of their capabilities and understanding of the support and training needed to improve the quality of their teaching.

A questionnaire was developed by the SeeBeyondBorders' education team and approved by the Battambang POE. All interviewees were asked the same questions. One-on-one interviews were conducted by SeeBeyondBorders' staff (Mentor Development Coordinators), and generally lasted 30-35 minutes. Responses to multiple choice questions were recorded on a standard checklist while answers to open-ended questions were recorded verbatim.

3.6 Interviews with Principals and Other Stakeholders

3.6.1 School Principals

Interviews were conducted with the principal from each of the 20 schools included in our research. Within schools, the principal is in a unique leadership position to observe and shape teachers. The purpose of these interviews was to provide qualitative information on teaching and learning in schools, support offered to classroom teachers, support offered to principals at provincial and district level, challenges in schools, and resources available to schools. Interviews were conducted by SeeBeyondBorders' staff on a one-to-one basis using a standard questionnaire agreed with BEST and approved by the POE. Interviews generally lasted for 45 minutes to one hour. Answers to multiple-choice questions were recorded in a standard checklist, and answers to open-ended questions were recorded verbatim.

3.6.2 Other Stakeholders

As part of this research, information was gathered from those in the Government and in the community with an interest in school education. In order to obtain a comprehensive view, we included interviews with non-teaching stakeholders – those associated with planning and management of individual schools (School Support Committee members - SSC), district and provincial representatives involved in developing policy and plans (POE, DOE), and those involved in providing support and training for teachers and principals (DTMT).

One-to-one interviews were conducted with representatives of each of these stakeholder groups using a standard questionnaire (agreed with the BEST and approved by the POE). SeeBeyondBorders' Mentor Development Coordinators conducted the interviews, which generally lasted 45 minutes to one hour. Answers to multiple-choice questions were recorded in a standard checklist, and answers to open-ended questions were recorded verbatim.

We interviewed the leader of each SSC in the 20 target schools to assess their understanding of the roles and capabilities of teachers and principals, and their opinion of the current standard of teaching in their schools. We were also interested in their understanding of the challenges faced by principals and teachers, and to hear their suggestions for improving teaching quality.

We interviewed the leaders of the DTMT in both districts, the Director of one of the DOEs and the Deputy Director of the other DOE. We were interested in their understanding of the current situation in relation to teacher quality, and we wanted to hear about how often DTMT members visit schools and the challenges they face in supporting teachers and principals. We were also interested in their recommendations to improve teacher quality. A one-to-one interview was also conducted with the Deputy Director of Battambang POE.

3.7 Data Analysis and Reporting

Data was collected in the field in paper form, and returned to SeeBeyondBorders' head office in Battambang for data entry and analysis by the university researchers, under the supervision of SeeBeyondBorders' staff. Data was primarily recorded using Excel spreadsheets that were also used for data analysis, and for the creation of graphs to illustrate results.

Quantitative data, such as student test results and teacher knowledge test results, were entered into previously created spreadsheets with cells formatted to identify any data incorrectly entered. These spreadsheets auto-calculated pass and fail rates and ensured there was minimal risk of users entering data incorrectly. The project manager checked a random sample of the data against test papers, to ensure data entry was accurate.

Qualitative data (such as teacher and school principal interviews) was analysed in a slightly different way. This data was collected using checklists (classroom observations) and recording sheets (interview questionnaires), and was then entered into Excel spreadsheets. Responses to multiple choice questions were recorded in Excel spreadsheets, then analysed to identify trends. Responses to open questions were recorded verbatim, then grouped and analysed by the project team who identified trends, and extracted key quotes.

3.8 Research Limitations

SeeBeyondBorders' track record of working with schools and communities at a local level did help gain a privileged level of access and insight into classrooms in rural schools, and to hear candid accounts from teachers and principals about the challenges they face. Combining and comparing data from different sources enabled us to obtain a reliable and comprehensive picture of the current situation in the primary schools in the study.

Every effort was made to collect data from a wide range of schools, students and teachers. It would be unwise however, to assume these results are representative of all rural schools in Cambodia, and the results should not be used to make assumptions about teaching quality throughout Cambodia. Specifically:

1. The research was conducted in just 20 schools in two districts and involved evaluations around 58 teachers and their grades 1 to 3 classes. There are some 50,000 teachers in Cambodia across the education system and schools vary widely in terms of their access to resources. Typically, papers addressing the situation of education in Cambodia classify schools as being 'Urban', 'Rural' or 'Remote', and the schools examined in this study fall solely into the Rural category. Therefore, conclusions from this analysis should not be applied to the Cambodian education system as a whole, or even to all rural primary schools.

   We recognise this limitation but believe that the conclusions are a useful inclusion in the debate around future priority intervention needs, especially given they confirm and corroborate findings from similar studies in Cambodia as well as SeeBeyondBorders' own wider experience.

2. As addressed in the introduction, the nature of the problem and possible solutions have been explored in this research primarily from the perspective of teachers' knowledge and skills. Considerations as to the impact of other factors such as poverty or social capital are not examined in this report. Evaluation of these causes warrant separate and more detailed analysis, especially for example the impact of itinerant labour both within Cambodia and across national borders. However, every attempt has been made to highlight the relevant priorities when looking at effective interventions in the current context.

3. Evidence from interviews in Cambodia can be inherently weakened by suspicion from interviewees over the rationale for the questions and the uses to which the answers given will be put. This is a continuing hangover from the brutality experienced in Cambodia's recent past, and to move beyond eliciting responses that the interviewee thinks is required, to what the interviewee them self believes (social desirability or perhaps 'sponsor' bias), requires the build-up of trust over several years. Greater use of focus groups or Qualitative Interviewing techniques might have provided a variation to the picture provided by the interview results.

4. Questions relating to what people do tended to have a higher level of social desirability bias and were viewed accordingly. Further, it is our conclusion that when asked specific questions about limitations in the education system, respondents under stated their view of problems, believing instead that there is a level of inertial and external inevitability about the status quo which makes changing behaviour more difficult than the responses suggest.

3.9 Practical Challenges

Researchers faced a number of specific practical challenges when collecting data for this research in relation to the biases referred to above. During interviews, researchers advised interviewees their answers were confidential and there were no right or wrong answers. However:

- Teachers were very hesitant to talk openly and honestly about their relationships with school principals and about the challenges they face when teaching. They were concerned any 'complaints' would cause trouble for them.

- The majority of school principals and teachers found it very difficult to identify the barriers preventing a high

quality of teaching at their school. They have never before been asked for their opinion on how to improve this situation and therefore were unable to respond in any great depth.

- Some school principals provided verbal information, but were unable able to back this up with evidence. While we were asking for personal opinions, it was not easy to ascertain the cogency of them without examples that led to that opinion.

- Most school principals (said that they) had not previously considered how they might be able to improve the quality of teaching in their school and they had no specific plans they could discuss.

- A number of principals had been in their position for less than a year and did not know how to access information relating to previous years. It was significant that although school principals devote a large amount of their time to collecting data on absenteeism, expenditure, and other aspects of administration, the data is not necessarily stored in a structured or user-friendly way, and is therefore difficult to access.

3.10 Areas for additional research

There are a number of areas that we were not able to research and would warrant further investigation including the following:

a) A further follow-up study, with a wider geographical spread and examination of other curricular areas, would be valuable in assessing the national situation. We comment on the need for realistic assessment of learning as a vital tool in determining appropriate interventions as well as a tool for monitoring their effectiveness. However, despite the work done on EGRA and EGMA, there is little widespread, methodical, coherent and accepted assessment data available. Further research on the extent to which students are meeting MPLs in Cambodia is needed.

b) Considerations as to the impact that other factors that are poverty or social capital related, have not been examined in any detail in a Cambodian context. Evaluation of these causes warrant separate and more detailed analysis, especially for example the impact of itinerant labour both within Cambodia and across national borders.

c) Closely related to the above would be the impact of social structures and the inter relationships with the residual trauma of the Khmer Rouge. Cambodians have a cultural preference to solve problems collectively and are more comfortable making decisions on a communal basis, and yet the education system operates on a rigidly hierarchical structure. It is possible that this has supressed problem solving and innovation. High levels of central control is evident in western education systems to their detriment, so this is not a peculiarly Cambodian problem, but the interplay with the hangover from the dislocation suffered by so many of the older teachers and educators, which has inevitably had an inter-generational impact, makes this worth studying in Cambodia. There are notable parallels with the Australian indigenous population and the "Stolen Generation".

4 Research Results and Discussion

Below is a summary of our research findings relating to students, teachers, principals and other education professionals in the schools within the project. More detailed analysis and further graphic representation is included at Appendix 1.

4.1 Testing of Student Knowledge and Understanding

4.1.1 Overview of the process and results

Student testing was conducted in June 2017, towards the end of the school year and included only those concepts that should have been taught during the year. The tests (using Khmer script and numerals) were based on the types of questions contained within the MoEYS graded textbooks.

Our analysis of student test results has allowed us to study, in further detail, which concepts caused particular difficulty for students in each grade. We provide below a summary of our research findings in the schools within the research project. For more detailed graphic representation and analysis, by grade and concept area, please refer to Appendix 1

Students displayed a poor knowledge of the curriculum in both Bavel and Thmor Kol, as evidenced in the graphs below. While 36% of grade 1 students across both districts passed the mathematics knowledge test, this dropped to only 7% in grade 3.

The results show that as the concepts and problems become more complex (requiring students to have not only procedural fluency but also a conceptual understanding of mathematics) the students' achievement rates plummet. We believe our detailed analysis of the results by concept (see Appendix 1 for full analysis) reinforces our assertion that students are not gaining a conceptual understanding at a foundational level. In subsequent years, teachers move quickly on to introducing a purely procedural approach to solving algorithms. Lacking solid conceptual understanding at a foundational level on which to build their understandings, students find themselves unable to solve more complex and abstract maths tasks in subsequent years.

Graph 2: Overall Student Pass Rates
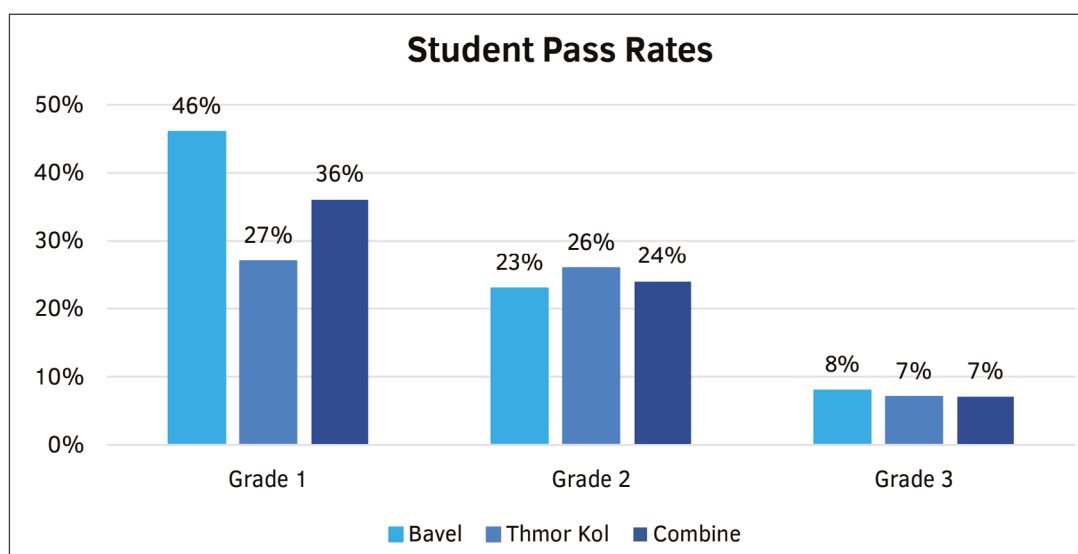
Graph 3: Student Average Scores

Student Pass Rates

	Grade 1	Grade 2	Grade 3
Bavel	46%	23%	8%
Thmor Kol	27%	26%	7%
Combine	36%	24%	7%
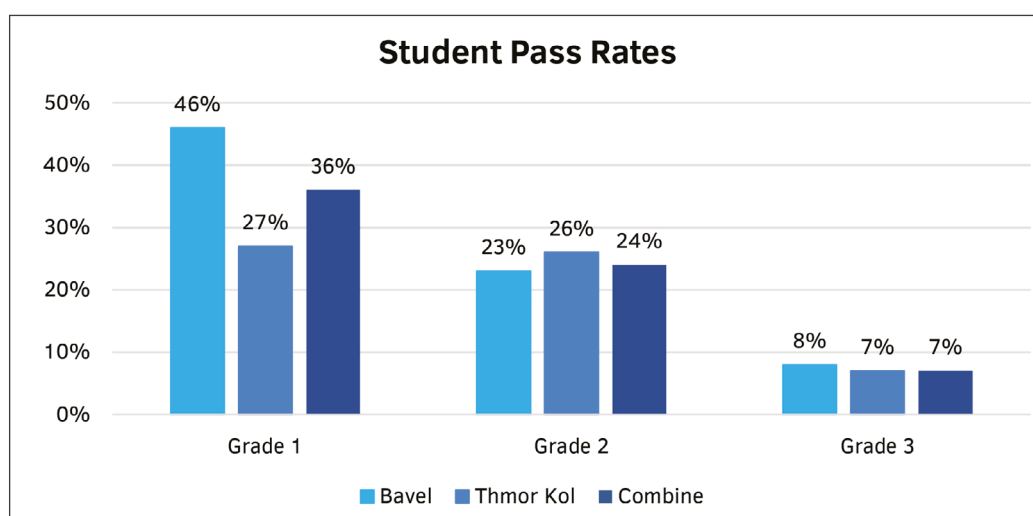
Table 5: Student test results by district and by gender

Grade 1		Grade 2		Grade 3		Total		
Female	Male	Female	Male	Female	Male	Female	Male	All
179	**157**	**163**	**166**	**178**	**158**	**520**	**481**	**1,001**
88	82	87	77	97	75	272	234	506
91	75	76	89	81	83	248	247	495
68	**54**	**44**	**36**	**10**	**15**	**122**	**105**	**227**
43	35	20	17	5	9	68	61	129
25	19	24	19	5	6	54	44	98
38%	**34%**	**27%**	**22%**	**6%**	**9%**	**23%**	**22%**	**23%**
49%	43%	23%	22%	5%	12%	25%	26%	25%
27%	25%	32%	21%	6%	7%	22%	18%	20%

Table 5 shows how the test results break down for each grade by district and by gender. The following section breaks down the results by type of school which is more instructive than by district, since each district has a different mix of schools which is not immediately obvious. Bavel has a higher proportion of schools in small towns and generally scores better than Thmor Kol. Females in Grade 2 is an exception. Females perform better than males in their tests in Grades 1 and 2 but the position is reversed in Grade 3 where all results are very low.

4.1.2 Test results by location and gender

Table 6 suggests that schools in commune centres or small towns do a marginally better job in terms of providing learning, which accords with an intuitive assessment, although there is only a 5% overall difference. The proportion of females is 14 percentage points higher than males in the commune centre and small town schools, a position that reverses itself in the rural schools to 8 percentage points in favour of males. It would require further research before any concrete deductions could be made from this gender mix but there is a suggestion that there is greater willingness to send girls to school in the less rural areas. However this might simply be an age group mismatch given that we are only looking at a single year.

Table 6: Test results by location and by gender

		Schools in a Commune Center or Small Town	Schools in a Semi Rural Area	Schools in a Rural Area
No. of schools		**6**	**7**	**7**
Students				
	Grade 1	103	119	114
	Grade 2	102	113	114
	Grade 3	103	121	112
	Total	**308**	**353**	**340**
Pass				
	Grade 1	38%	34%	37%
	Grade 2	29%	22%	22%
	Grade 3	11%	7%	5%
	Total	**26%**	**21%**	**21%**
Fail				
	Grade 1	62%	66%	63%
	Grade 2	71%	78%	78%
	Grade 3	89%	93%	95%
	Total	**74%**	**79%**	**79%**
Gender				
	Female	57%	53%	46%
	Male	43%	47%	54%
Female				
	Pass	30%	18%	23%
	Fail	70%	82%	77%
	Total	**100%**	**100%**	**100%**
Male				
	Pass	21%	24%	20%
	Fail	79%	76%	80%
	Total	**100%**	**100%**	**100%**

4.1.3 Test results by teacher

In an attempt to identify some correlation between a teachers years of training and student achievement, we have plotted the proportion of students that passed against teachers' experience as follows:

Graph 4: Student test results by teacher experience

Student Pass or Fail by Years of Teacher Experience

Experience	Pass	Fail
Over 25 years	23%	77%
21 – 25 years	13%	87%
16 – 20 years	21%	79%
11 – 15 years	25%	75%
6 – 10 years	14%	86%
1 to 5 years	30%	70%
Less than 1 year	27%	73%
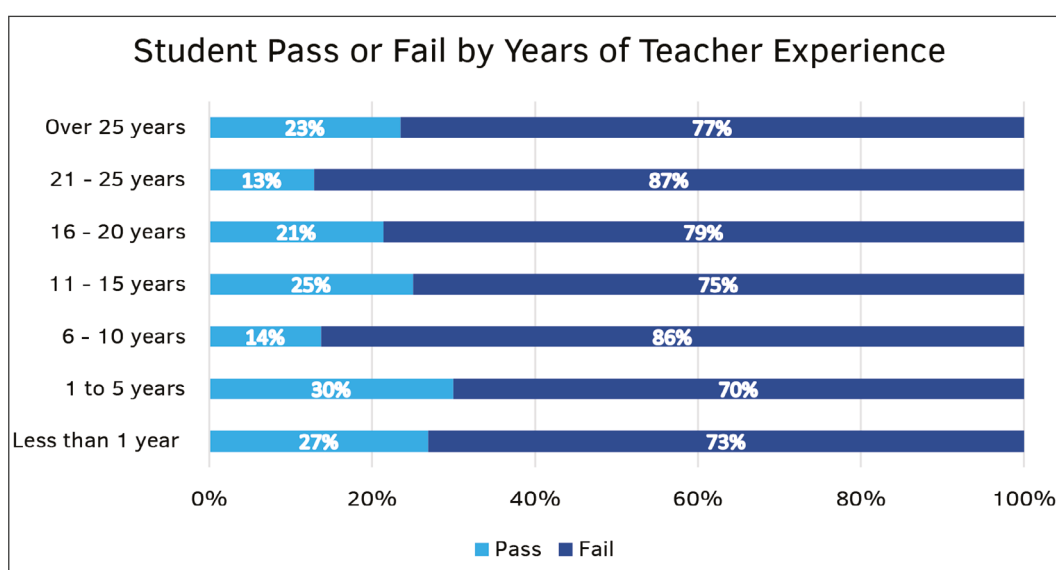
The data is inconclusive. It suggests there is no benefit from additional years of experience. If anything it suggests that newer teachers do fractionally better than the older teachers. We have looked to see if this is impacted by the mix of grades taught by each level of experience. If teachers of greater experience teach proportionately more Grade 3 classes by comparison with Grade 1, this would suggest that this pulls down their scores given that by the time children reach grade three they seem to be learning very little.

Graph 5 shows the breakdown of the grades as taught by teachers at each level of experience and it appears that the mix, while dissimilar would not dramatically skew the results in the previous graph. It does offer an explanation as to why teachers with 6 – 10 years' experience seem to perform poorly which may be because they have proportionately the highest number of Grade 3 classes.

Graph 5: Number of classes taught by teachers of each level of experience
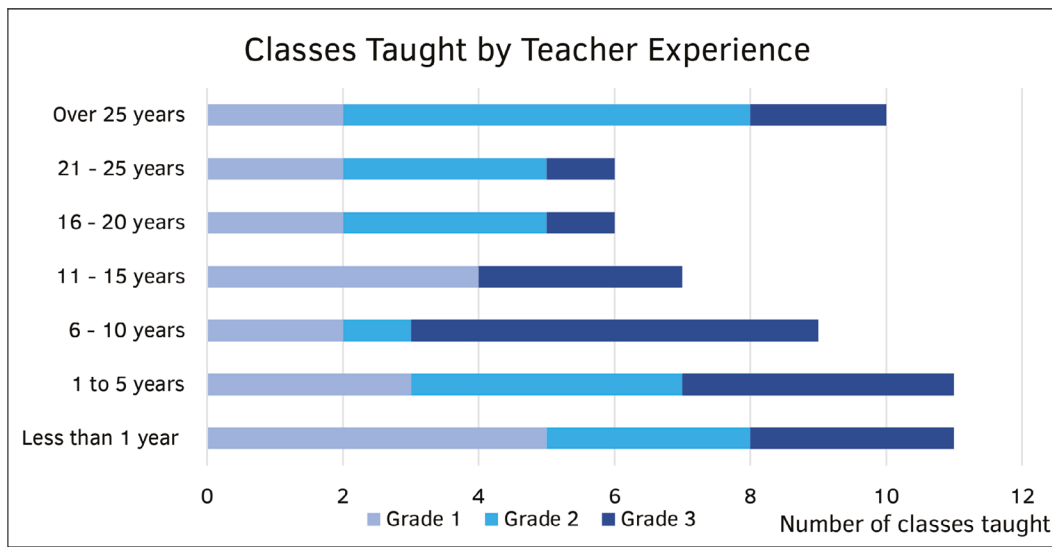
4.1.4 Grade 1 Student Test Results

The best performing students were grade 1 students in Bavel district: 46% of them passed the test. This was a higher pass rate than that of the grade 1 students in Thmor Kol district, where only 27% passed. No discernible reason was apparent for this disparity and it did not continue in higher grades (see below).

All test questions focused on basic mathematical concepts that are important for grade 1 students to understand and to be able to apply before progressing to grade 2. Lack of knowledge and understanding at this stage is likely to have a serious adverse effect on students' ability and motivation to remain in education and progress to secondary school.

Graph 6: Grade 1 Test Results
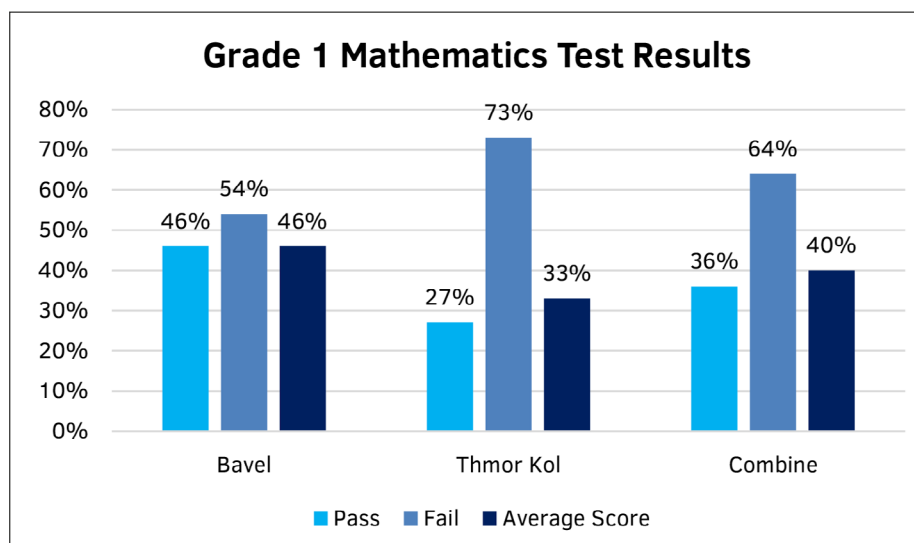
In relation to the individual concepts tested, the findings were fairly consistent across both districts. Based on the average result across both districts, we detail below the most significant findings in relation to areas of achievement and challenge at this grade level. For more detailed results, please see Appendix 1

Most significant challenges

- Counting backwards from a random number less than 20 (15% average student achievement rate)

- Writing numbers to indicate the total value of spoken words. (e.g. "Five tens and four ones" Answer = 54) (8% average student achievement rate)

- Writing the correct numerals in a place value chart to show total number of ten sticks and unit blocks (13% average student achievement rate)

Concepts with higher rates of student achievement

- Counting forwards by ones from 1-10 and identifying a number missing in the sequence

- Filling in a number sentence to match pictures representing addition of two one-digit numbers (e.g. 1+4=5)

- Using pictures to find the total when adding two groups of objects

4.1.5 Grade 2 Student Test Results

Amongst grade 2 students, the results were similar in both Bavel and Thmor Kol, with only 24% of students passing the mathematics test across all schools tested in the two districts. The average score across both districts was 30%.

Graph 7: Grade 2 Student Test Results
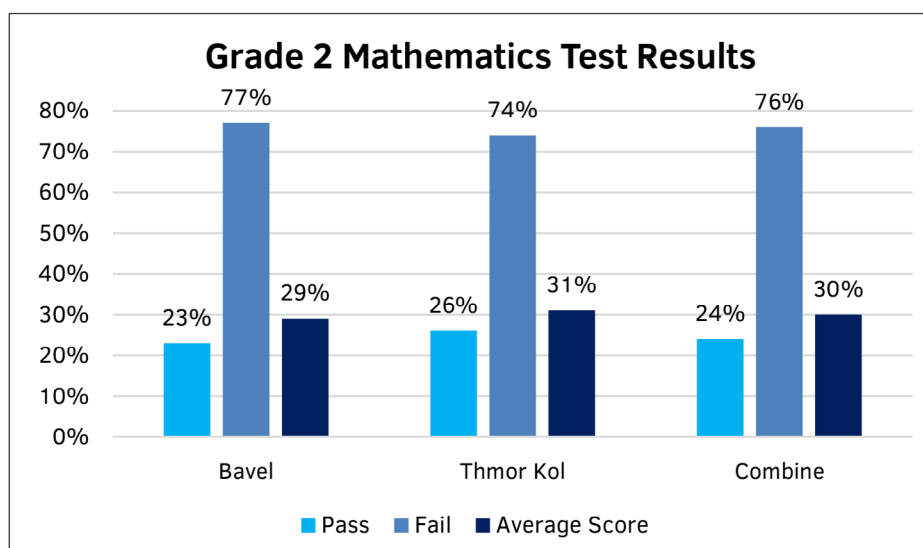
Based on the average result across both districts, we detail below the most significant findings in relation to areas of achievement and challenge at this grade level. For more detailed results, please see Appendix 1

Most significant challenges

- Students achieved very poor results in **all** questions which required a conceptual understanding of place value, which further supported our observation that whilst students are able to successfully perform simple algorithms that can be solved using rote learned procedures, they are not capable if they are presented with a problem which requires not only *procedural* fluency but also a *conceptual* understanding of place value, as demonstrated below:

  - 62% of students could perform an addition problem, adding two two-digit numbers where **no 'trading'** was required,

  - Only 19% of students could perform an addition algorithm involving two- or three-digit numbers where trading **was** required.

  - Similarly, 44% of students could subtract a three-digit number from a three-digit number **without trading**,

but only 11% of students could perform a similar subtraction algorithm where trading **was** required.

- Word problems posed significant difficulty, which may be linked to their poor reading skills. However, even when students had word problems additionally read to them several times, only 6% of students could draw a picture to demonstrate this given word problem: "There were 9 cats playing in a group. Suddenly a dog came and chased 7 cats out of the group. How many cats remained in the group?" Only 9% could write a number sentence to represent this same problem

- Only 7% of students could perform subtraction using a number line, although number lines feature regularly in their text books.

Concepts with higher rates of student achievement

- Completing number sentences to add a two-digit with a single digit number

- Students demonstrated a reasonable level of achievement in tasks requiring procedural fluency, such as completing addition and subtraction vertical algorithms, where trading is not required

4.1.6 Grade 3 Student Test Results

The testing of grade 3 students revealed very concerning results with only 7% of students successfully passing the test (8% in Bavel district and 7% in Thmor Kol). The average score across both districts was 29%.

Graph 8: Grade 3 Student Test Results
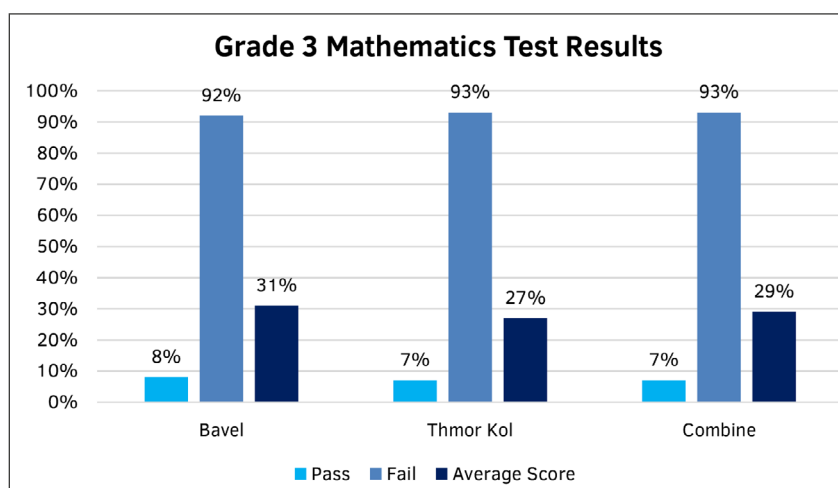
The concepts covered in this test paper are those which should be readily understood if students have been taught soundly in the earlier grades. As the problems become more complex, students are required to use problem solving skills and be able to generalize based on their conceptual understandings from previous years. The lack of achievement by the grade 3 students demonstrates poor understanding of concepts taught in earlier grades, and therefore an inability to generalize, and poor problem solving skills.

Based on the average result across both districts, we detail below the most significant findings in relation to areas of achievement and challenge at this grade level. For more detailed results, please see Appendix 1.

Most significant challenges

- Of particular interest are the results which relate to solving addition and subtraction problems. Whilst 39% of students could solve *vertical algorithms* which required trading, (adding three-, four-, or five digit numbers), only 22% of students could solve easier three- digit addition problems, when they were represented as h*orizontal number sentences*. (See Appendix 1 for further details). The same pattern emerged in relation to subtraction. Whilst 32% of students could complete a *vertical algorithm* for subtraction between two four-digit numbers, where trading is required, only 13% of students could successfully solve a similar problem, using three-digit numbers, in a given *horizontal number sentence*. These examples demonstrate a dependence on rote learned procedural fluency and an inability to generalize when a problem is presented in an unfamiliar format.

- Students showed an extremely poor understanding of fractions. Only 2% of students could identify the fraction of an area, when presented with a whole shape, divided into equal portions, with a fraction of it shaded in. 4% of students were able to correctly find the fraction of a collection (e.g.: "What is half of 30" or "What is one third of nine?")

Other concepts which proved challenging

Specific examples of other concepts students found challenging (please see Appendix 1 for more details):

- Stating the value of a numeral in a four or five digit number according to its place value

- Describing, comparing and ordering three- and four-digit number.

- Using appropriate strategy for multiplication of a two-digit number by a single digit number, in a given number sentence, where trading is required

- Using correct procedure for multiplication of a two-digit or three-digit number by a single digit number, in a vertical algorithm, a) where trading is not required, and b) where trading is required

- Solving problems involving division of a two- or three-digit number by a single digit number, whether displayed as a horizontal number sentence or a formal algorithm

Concepts with higher rates of student achievement

Listed here are those concepts where students scored better, although the highest percentage of student achievement across all concepts was only 51% (see below):

- Using an appropriate strategy to add two three-digit numbers, in a given number sentence, where trading is not required (51% average student achievement rate)

- Using correct procedure for subtracting between three-digit numbers in a vertical algorithm, where trading is not required (44% average student achievement rate)

- Using an appropriate strategy for multiplication of a two-digit number by a single digit number, in a given number sentence, where trading is not required (40% average student achievement rate)

4.2   Primary School Teacher Mathematical Knowledge Tests

There were 31 questions in the written knowledge tests completed by teachers, on the mathematical concepts in the grades 1-3 Maths curriculum. These tested their ability to answer the types of questions posed to their students in an annual Maths test given by SeeBeyondBorders. These were questions which we would have expected teachers to have had no difficulties in answering. A score of 50% was deemed to be a pass (16 marks).

Graph 9: Teacher Knowledge Test Scores
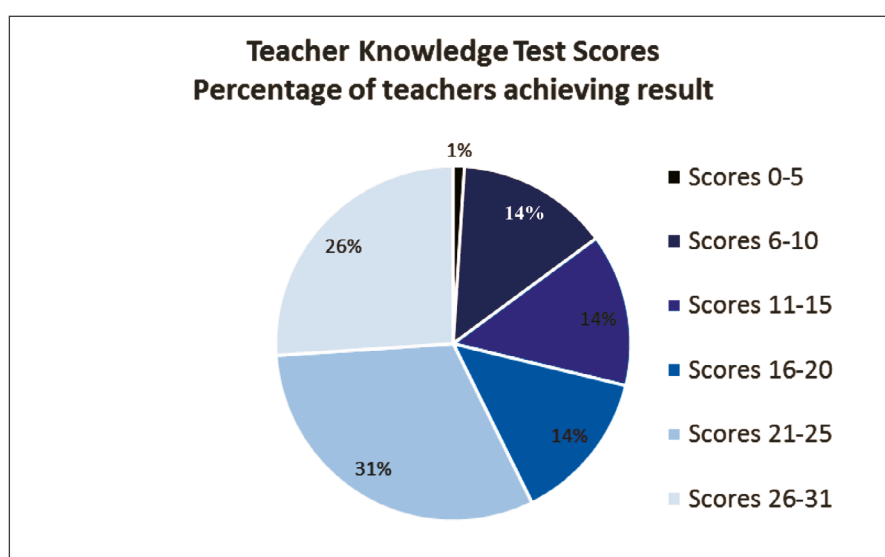
The test assessed the teachers' ability to answer: i) early years level questions on the four operations: addition, subtraction, multiplication and division; and ii) early years level questions related to patterning, fractions and decimals.

Whilst 71% of teachers achieved a mark of over 50%, 29% of teachers achieved a mark of less than 50% as per the breakdown in Graph 9. Only 14% scored a mark over 90%, with nearly half (48%) scoring between 65% and 89%. The average mark was 20/31 (65%).

These results show that whilst many of the teachers can pass a student level test and have a basic grasp of the mathematical concepts from the grades 1-3 curriculum, there is an alarming number of teachers who could not demonstrate even a basic level of understanding of the subject material they teach.

Graph 10: Teacher Pass Rate by Content Areas
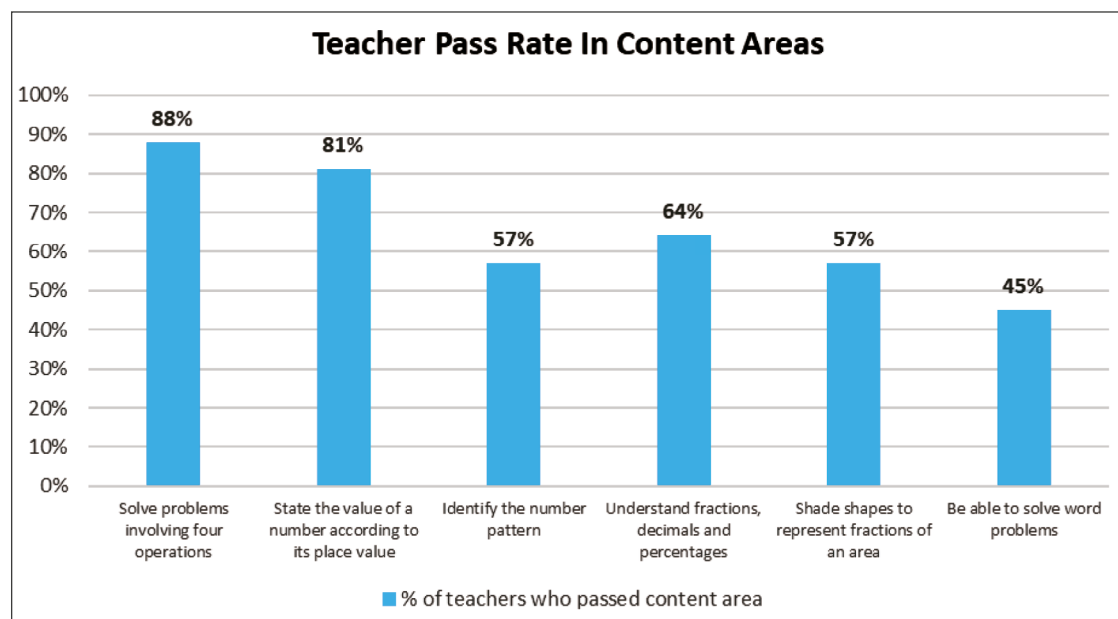
The vast majority of teachers (88%) were able to solve computations using the four mathematical operations and 81% were able to identify the value of a numeral according to its position using a place value chart (Graph 10).

Significantly, most of the marks were lost on questions about number patterns, word problems or fractions when looking at shapes. This reinforced our experiences in other districts, where we have found that mathematics problems that require teachers to apply a conceptual understanding to abstract scenarios, rather than simply following a rote-learned procedure, pose the biggest challenge for them. This supports our belief that whilst many teachers may have acquired procedural fluency, they do not have a deep conceptual understanding of the Mathematics themselves.

4.3   Primary School Teacher Mathematical Teaching Skills

During classroom observations, teachers were assessed across six different teaching skills as identified in Graph 11 below:

   i)   lesson planning;

   ii)   use of a variety of teaching activities;

   iii) use of teaching resources;

   iv)   capacity to support different learners;

   v)   use of a variety of different questioning techniques; and

   vi)   classroom management.

26% of teachers had prepared a basic lesson plan while less than 10% of teachers were able to demonstrate any of the other skills assessed. Only one teacher in the research sample was observed performing all six skills with confidence and a basic level of competence.

Graph 11: Teacher Observation Results

Teacher Observation Results (n=58)

Skill	Percentage
Demonstrated all SIX SKILLS	2%
Management	2%
Questioning	2%
Difereniates	3%
Resources	7%
Activities	5%
Lesson plan	21%

■ Percentage of teachers who demonstrated this skill
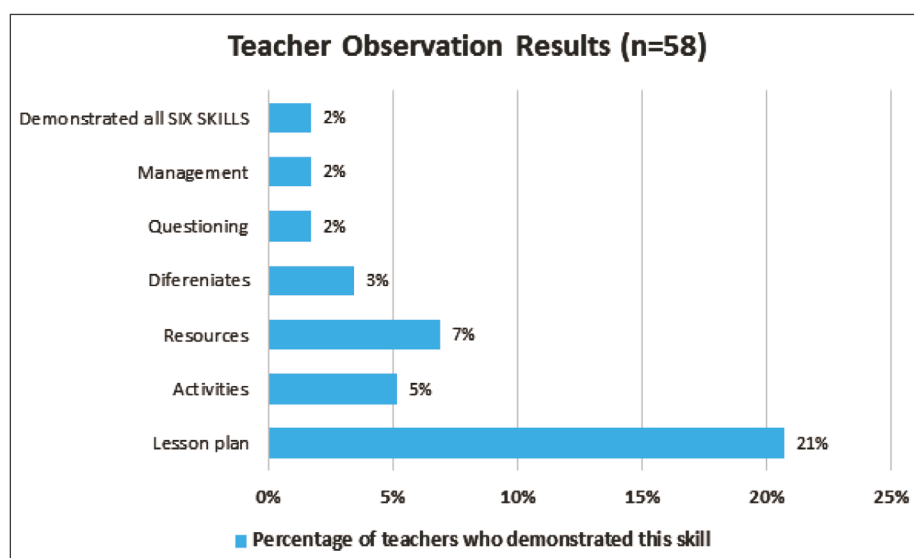
The following findings from the classroom teacher observations were significant:

1. Lesson Planning

- While 26% of teachers had prepared a lesson plan, only 22% had an identified lesson objective. Some of these teachers referred to the lesson plan regularly throughout the lesson, others had used it to plan activities but did not refer to it again through the lesson. (When questioned about this in the teacher interviews, many teachers told us lesson plans "take too long to prepare").

- None of the teachers had attempted to establish a context for the lesson by planning introductory activities to check students' prior/current knowledge of the concept being taught or to check for student misconceptions. This is an indicator on our skills scale which even the teacher who displayed basic competency in all skills, did not achieve.

2. Selecting and implementing relevant activities

- Only 3 teachers demonstrated basic skills in all identified aspects of selecting, modelling and facilitating activities appropriate to the lesson objective.

- 72% of teachers modelled learning 'activities' for the students to teach the concepts addressed in the textbook. (It should be noted here that most teachers were observed simply working through the textbook in page order using the exercises in the textbook as the basis of their lesson. Our experience in other districts has shown that teachers generally work directly from the textbook and are often unable to correctly identify the concepts being addressed or the intended objective of the demonstrations and exercises contained within it).

- 53% of the teachers modelled an activity that both related to the concept addressed and was appropriate to either their own stated learning objective or that in the textbook.

- The teacher modelled 'activities' were generally procedural (i.e.: teacher scribing and completing an algorithm on the blackboard). Some teachers attempted to model examples by drawing on the board in the absence of concrete materials.

- Only 31% of teachers included a guided session, where selected students modelled the activity for the class again, supported by the teacher.

- Only 50% of teachers provided students with an opportunity to then undertake an activity themselves, (whether individually, with a partner or in small groups) with only 40% of teachers having planned or prepared such an activity.

- In 36 of the classrooms observed, the majority of students were able to complete the textbook exercises correctly, although this generally involved copying off the board rather than solving algorithms independently.

- In general observers noted that teachers aimed to get their students to be able to solve abstract algorithms using processes performed by rote as opposed to developing a conceptual understanding with the aid of concrete materials.

3. Use of resources

- 45% of teachers used some type of resources during the lesson, however in 39 of the classrooms observed, not all the students could see the modelled activities or the resources being used.

- In only 6 of the classes observed, were resources used by the students themselves. (It was not documented whether this was because the teacher neglected to consider this, or whether there were not sufficient numbers of resources available).

4. Supporting student learning

- Whilst 38% of teachers made an attempt to 'rove' and support students undertaking independent or group work, only 6 teachers attempted to assist students who found the tasks more challenging.

- During teacher interviews teachers reported their classes are too big and they find it difficult to support individual learners. Teachers did not seem to be aware of any simple methods to support these learners and much of the problem seemed to be a result lack of knowledge about the strategies available to effectively integrate these students into lessons.

- Just 2 teachers were able to differentiate tasks for the students who required extra support.

- There was no evidence of teachers providing extension activities for those students who required more challenging tasks.

5. Strategic Questioning

- 22% of teachers were observed attempting to use questions which required more than "Yes/no" answers, but the researchers argue that in general there were poor levels of understanding demonstrated, the learning environment did not encourage questions from students and there was limited attempt to clarify understanding, or to ask students to explain their reasoning.

- Individual students were called to the board to solve a problem, but we witnessed no examples of teacher and students having a meaningful conversation about what the student was doing or why. The common response when the problem was completed was to ask the class "Is it right?" or "Do you understand?" and the class answered in unison, "Yes teacher. Thank you, teacher".

Skills assessed during these classroom observations were those which are universally important, and teachers should be able to demonstrate competence in all areas. For quality teaching to be achieved, teachers must demonstrate a combination of these skills and importantly, be confident in all of them. Only one teacher in the research sample was observed performing all skills with confidence and competence.

This result is in stark contrast to those areas of Bavel district where SeeBeyondBorders has worked for 4 years. Here, as a result of professional development and support, 98% of teachers (55 teachers) now consistently perform all six skills at level 2 or above, on a 4-point scale, where level 4 is considered exemplary in a Cambodian context (see Section 5.4.2 for further detail). Test results show a strong correlation between these high levels of competence and student learning outcomes.

4.4   Teacher Interviews - Teacher Training Climate for Primary School Teachers

The purpose of interviews with teachers was to provide an opportunity for them to tell us more about their experiences, to ask them about the challenges they face in their jobs and to ask them what support they needed in order to improve the quality of their teaching.

Inevitably a level of bias was identifiable in the responses as discussed in Section 3.8, but every effort was made to interpret the data as independently as possible after triangulating responses.

4.4.1 Training in the Past Two Years

Almost 90% of teachers confirmed they have participated in Thursday Technical meetings. This is not a surprise as attendance is mandatory. Seventy-four per cent of teachers in the research districts have attended training on literacy in the past, but less than 20% have received training in other subjects, such as mathematics, social sciences, science, sport or health.

Thirty six percent of teachers reported they have received mentoring or peer observation from Technical Grade Leaders (TGLs) in the past, and further analysis (see Graph below) demonstrates the impact of this activity was rated as moderate to high by 81% of participants.

Graph 12: The Thematic Area of Previous Training Received by Teachers

Previous Training/Support Thematic Area — Mathematics 19%, Literacy 74%, Social Science 12%, Science 10%, Participation in Technical Thursdays meeting 86%, Mentoring and/or peer observation by TGLs 36%
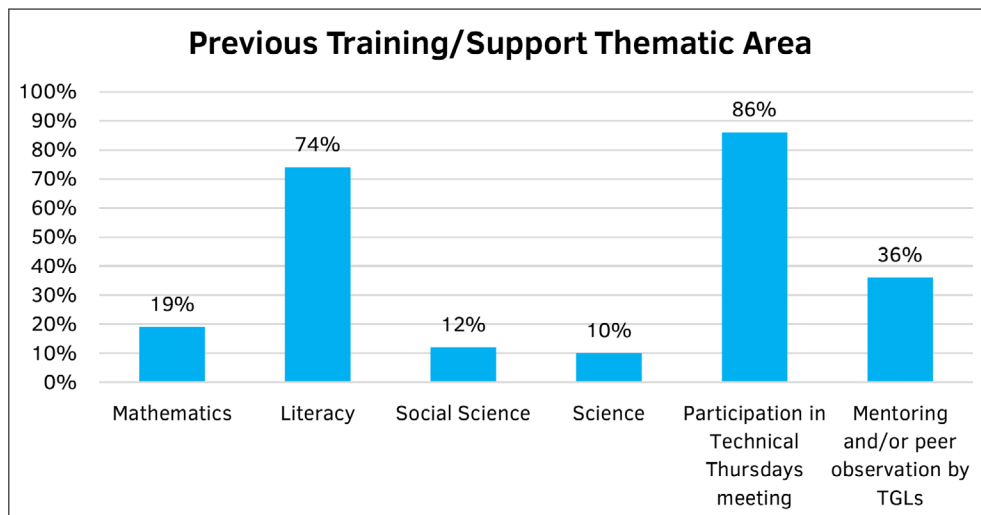
Teachers listed previous training they had received and identified the impact it had on their professional practice. More than four in five teachers (82%), of those who had received it considered previous mathematics training to have had either a moderate or large impact on their professional practice. Nearly half of respondents (46%) view the Thursday Technical meetings to have had a large impact on their practice.

4.4.2 Teacher Training Needs

All 20 principals and 58 teachers involved in the research were interviewed about the thematic and technical training needs of teachers in early grades. The answers from both groups are detailed in the graphs below.

Graph 13: The Thematic Area of Teacher Training Needs

Professional needs of Teachers (According to Principals)
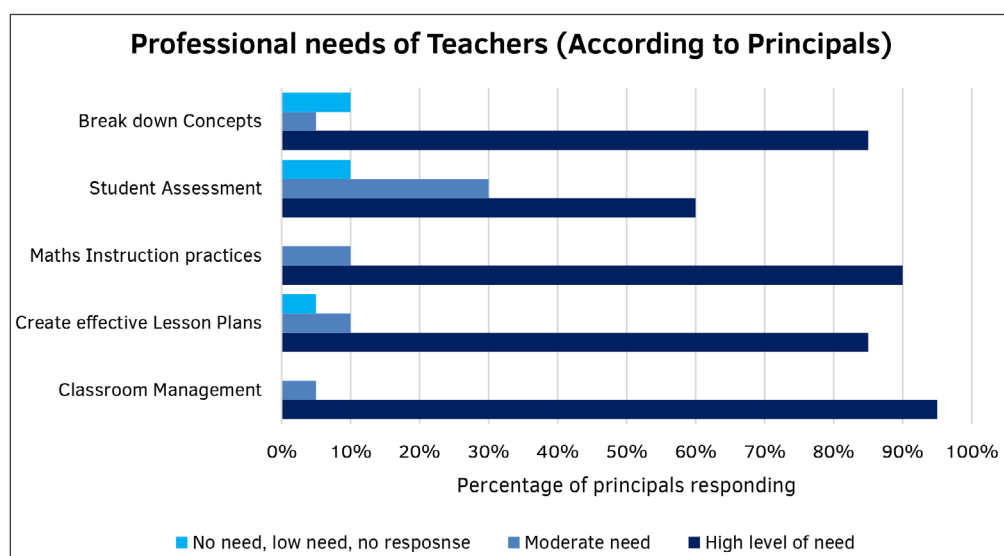
Principals are aware their teachers have a high level of need for training in a wide range of areas related not only to mathematics teaching, but also in general teaching techniques, methodologies and student assessment. Most principals (95%) believe there is a high level of need for training in classroom management techniques. 18/20 (90%) consider there is a high level of need for training on mathematical instruction practices and the same number feel there is a moderate or high need for training in student assessment.

Professional needs of Teachers (According to Teachers)

Percentage of teachers responding

Legend: ■ No need, low need, no resposnse ■ Moderate need ■ High level of need

Significantly fewer teachers (52%) – compared to the principals' responses - consider they have a high level of need for training in classroom management techniques. Although the teachers do not rate their training needs as high a need as the principals believed the teachers required (in areas such as mathematical instructional practices, creating effective lesson plans and breaking down concepts), the numbers are still relatively high, with more than half of teachers expressing a high level of need for training in four of the areas.

Student assessment data is not analysed in schools in relation to teacher practice or used to inform teacher planning - rather it is seen as a simple matter of administering a test and submitting the pass/fail rates, unanalysed, to the government. It is not surprising therefore, that only 47% of teachers see a high need for training in relation to student assessment, with 40% identifying this area as only a moderate need, with the remaining 12% considering there to be either a low need or no need at all, for training in student assessment.

4.4.3 Future Training

During the interviews, we initially asked teachers what support they felt would improve their teaching quality. This was a challenging question for many teachers, firstly because there is no culture of professional self-reflection and secondly, they do not have access to a menu of professional development options. As a result, many were initially unable to identify any areas of support that they felt would improve the quality of their teaching. When presented with specific ideas, teachers were enthusiastic about where they would welcome training as illustrated in the following graph. However, there are clear discrepancies between the professional training for which the teachers identified there was a high <u>need</u> and those identified as the subjects or concepts on which they would particularly <u>like</u> to receive training. For example 97% of teachers 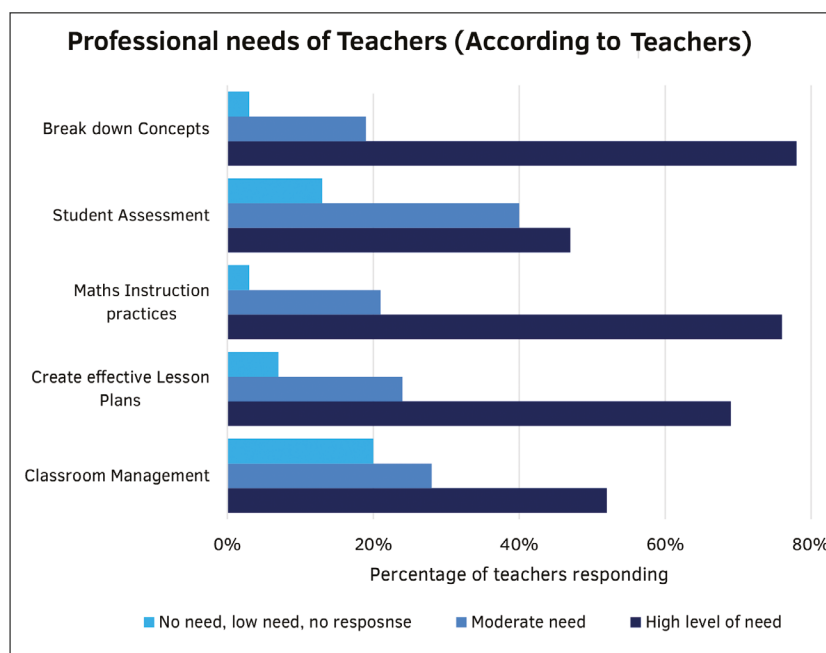listed their need for training in 'breaking down concepts' as moderate or high, but only 55% of teachers identified this as an area in which they would like to receive training. The subjects or concepts that most teachers identified as needed, appeared to be those which they perceived were directly linked to the specifics of delivering the content of their lessons, such as instructional practices, and accessing resources. This may be because these types of training were more familiar to the teachers; they could envision and identify with the type of training that would be involved; and they are areas that would potentially have practical, interactive components to the training.

Graph 15: Subjects or Concepts in Which Teachers Would Like to Receive Training

Subjects or Concepts in which teachers would like to receive training

Classroom management: 47%
Lesson planning: 50%
Instructional practices (Maths): 91%
Instructional practices (Literacy): 59%
Access to resources: 79%
Other: 9%

■ % of teachers who would like to receive training in this area
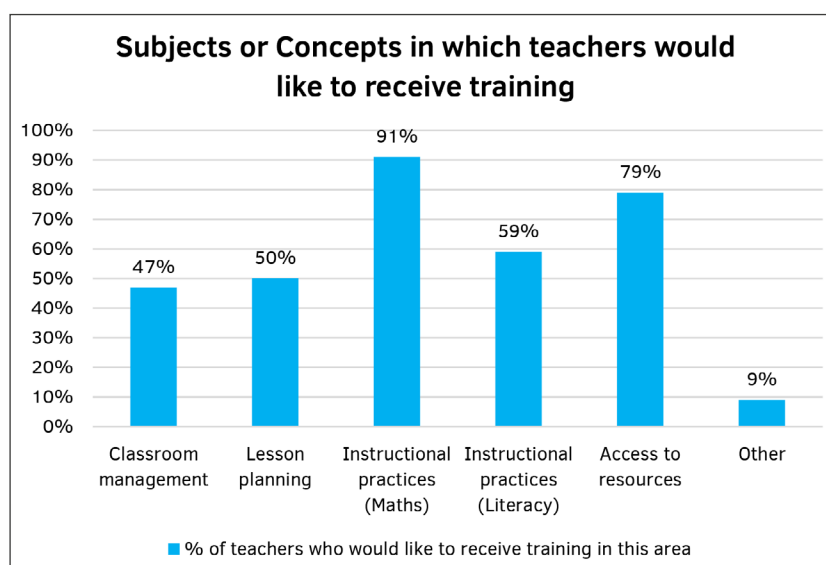
Teachers told us that they want to have regular support from the DOE and would like them to provide regular training to teachers. They also suggest DOE should encourage teachers to adhere to current regulations and codes of conduct.

Overall as commented further in the following section, it is striking that teachers do not know what can help them. In response to specific prompting against a list of needs and potential areas of support, teachers gave some strong responses, but it was not easy to identify whether this was simply acquiescence bias or a genuine recognition of need.

4.4.4 Challenges for Teachers

We spoke with teachers about the challenges they face when trying to improve the quality of their teaching. We also sought the opinion of the principals and asked them to identify the main challenges for teachers. A summary of the challenges identified by both teachers and principals is provided in Table 4 (below).

Table 7: Teacher Challenges

No	Challenge	Challenges for Teachers (According to Teachers)	Challenges for Teachers (According to Principals)	Gap in views
1.	Lack of research documents or tools	74%	80%	6%
2.	Poor basic content knowledge among teachers themselves	41%	50%	9%
3.	Preparing and following lesson plans	34%	65%	31%
4.	Not enough teaching resources or student books	34%	60%	26%
5.	Lack of in-service training	33%	50%	17%
6.	High levels of teacher absenteeism	10%	65%	55%
7.	Lack of teacher commitment	21%	60%	39%

Results here show two particular trends. The first is that there is a sizable gap between teachers' and their principals' perceptions of the behavioural challenges that teachers' face (items 6 & 7). This suggests a lack of mutual trust and something of a more casual or less professional attitude amongst teachers that causes some resentment amongst principals. Observers concluded that this stemmed from two points – a) a sense of isolation amongst teachers and a belief that they were doing their best under difficult circumstances with very little support and b) a sense of frustration amongst principals at their lack of authority over teachers, when they carry the responsibility for the action of teachers (see particularly the discrepancy in the scores for absenteeism).

The second trend is that when referring to factors relating to planning and delivery of effective lessons (items 3,4,&5), only about a third of teachers see these as a challenges compared to nearly two thirds of principals.

41% of teachers acknowledged that they lack content knowledge or feel their own educational background is insufficient to teach in grades 1-3, but 59% did not believe this was an issue. 91% wanted to receive training on instructional practices in Maths (Graph 15) which could be explained by a level of social desirability bias in the answers provided to interview questions. Observers identified that teachers really didn't know where they might improve or where there was a problem because they simply did not have any experience of good teaching practice.

The teachers are required to not only manage large numbers of children in the classroom, but also to understand the structure of the curriculum, plan lessons, and explain mathematical concepts. Those with a limited educational background themselves find that achieving the basic requirements is a significant challenge, before they have begun to consider how to improve. Concepts such as task differentiation according to student capacity is currently beyond their capability.

Principals identified a wide range of challenges for early grade teachers, including that the available in-service training is insufficient. Three in five principals consider teachers in early grades have a poor level of commitment, reporting that they did not follow the mathematics teaching schedule during the last school year. These principals went on to suggest that teachers did not follow the schedule because they had problems teaching students who had not enrolled in pre-school, resulting in those students having limited understanding of basic mathematical concepts.

However, the biggest challenge survey participants identify is a lack of access to research tools and resources (and on this teachers and principals agree) - they feel ill-equipped to teach the lessons. Many schools have no form of teacher resource library and the majority of teachers have no internet access. In addition many teachers do not possess research skills and access to resources is extremely difficult for teachers in rural areas.

> *"Training to teachers on teaching strategies is essential and teachers need to be equipped with the research tools and skills so that they can improve their teaching"*
> Principal, Bavel District
>
> *"As teachers, we need motivation and also regular professional training"*
> Teacher, Thmor Kol District
>
> *"I want teachers themselves to have commitment to their job and training on specific teaching strategies"*
> Teacher, Bavel District
>
> *"I want to know how to teach students of all abilities, do learning games, create teaching materials and devise appropriate lesson plans"*
> Teacher, Bavel District

4.5   Interviews with Principals

The education levels of principals in this study varied significantly. Two principals had completed grade 9 and then undertaken two years of teacher training. Half were educated to grade 12 and had completed two years at teacher training college. The remaining 8 had achieved a bachelor degree as well as their two years teacher training.

During interviews, principals were asked a series of questions about their involvement in school administration, providing support for classroom teachers, and about teacher training and teacher capability in relation to mathematics.

4.5.1   School Administration

Three quarters of principals report they are busy completing routine paperwork for DOE, and the completion of reports and record-keeping is time consuming. The vast majority of principals are involved in organizing and attending technical meetings every month. All the principals interviewed have developed an annual school development plan.

4.5.2 Teacher Support

Almost half of the principals report they have some involvement in classroom observation once or twice each month - demonstrating instructional practices or use of curriculum materials in a classroom; trying new instructional practices; giving feedback after observations, and examining and discussing student test results. 25% of principals report they do this only once or twice per year (Teachers say 40%) and a further quarter report they never do this at all (Teachers say 26%). 45% Say they visit classes 1-3 times per month (Teachers say 28%). Only one principal is involved in this as much as once or twice each week. This correlates with information from teacher interviews (Teachers say 2%).

4.5.3 Teacher quality in mathematics

Fourteen of the twenty principals rate the mathematics teaching in grades 1-3 in their school as 'good', with the remainder rating it as 'fair'. This may be attributable to social acceptability bias, since nearly two thirds of principals then go on to predict that 90% of their students will not pass the mathematics test at the end of the year and 17/20 of the principals state that their teachers need major improvement in mathematics teaching, as does the mathematics program. Almost half say mathematics instruction in their school has improved in the past year, but a similar proportion report there has been no improvement. In relation to understanding of mathematical concepts, two-thirds of principals report their students are below grade level. Three quarters of principals state that teachers do not have enough mathematics resource materials to teach the students well.

4.5.4 Challenges for Principals in Overcoming Teacher Quality Issues

Principals identify a wide range of challenges in overcoming problems with teacher quality as indicated in the graph below.

Graph 16: Challenges for Principals When Trying to Improve Teaching Quality
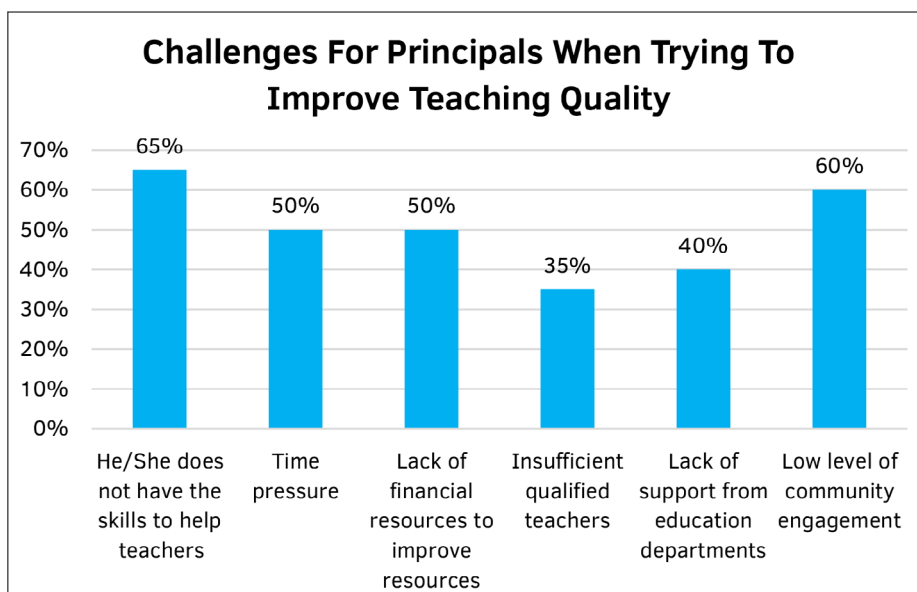
To overcome some of these challenges, principals seek support for teachers through workshops and training provided by NGOs or government education departments. Most of them also arrange training during Thursday technical meetings, and 60% have requested more support from DOE and DTMT.

Principals report that the biggest cause of student dropout and repetition is long periods of absence, as a result of parents taking children with them to Thailand or to work at remote farms. When students do not attend school for long periods, they find themselves very behind when they return to the classroom.

School principals suggest local authorities should organize a meeting to encourage parents to leave children with their relatives when they travel to find work. Principals believe this will help reduce school dropout rates.

All 20 principals stated that they do not have enough budget for buying resources to assist teaching and learning but just 8 reported that there are not enough teaching resource books.

Approximately one third of principals cite shortages of resources (both human and material) as a challenge in their school and:

- 6 out of 20 report insufficient numbers of qualified teachers at their school
- 7 out of 20 report insufficient textbooks for their students
- 6 out of 20 have no library facility at their school
- 4 out of 20 report the teachers do not have access to enough research tools or documents

In all cases even though all principals identified that they do not have enough budget for buying resources, only a relatively small percentage could state what they would spend additional budget on.

4.6 Interviews with Other Stakeholders

This section of the report is dedicated to summarizing the results of interviews with the School Support Committee (SSC) members; District Training and Monitoring Team (DTMT) members; District Office of Education (DOE) representatives; and the Deputy Director of Battambang Provincial Office of Education.

4.6.1 SSC Leaders

SSCs in Government schools have responsibility for setting priorities and preparing school development plans, then implementing and monitoring outcomes. Members of the SSC include village representatives, school principals and deputy principals, and the Village Chief. The Commune Chief and representatives of DOE are honorary members of SSCs. Each SSC elects a leader.

The 20 schools involved in this research study have a total of 63 School Support Committee (SSC) members, eight of whom are female. Eighty-five percent of SSC members believe their role primarily revolves around construction, repairs and school maintenance. A minority state they are also responsible for supporting student enrolment, fundraising, and implementing and monitoring their school development plan. All the interviewees have regular meetings with school management/school principals and 45% indicate meetings may involve discussion on how to improve teaching quality at their school. All SSC members believe teachers are economically poor, and need a second job, with many earning more in their second job than from teaching.

4.6.2 District Training Monitoring Team Leaders

Members of DTMT are employed in each DOE, in both district and cluster offices. All are ex-teachers, and their role is to visit schools to monitor and evaluate teachers and principals, as well as to provide support, training and mentoring. Twelve former teachers (3 female) are employed as DTMT staff in Bavel, and 12 (1 female) in Thmor Kol.

The creation of the DTMT role was supported by UNICEF who funded training and resources for the role to be active in districts across Cambodia, envisioning DTMT members to constitute a key group in the provision of support for schools and a link between the DOE and teachers and principals. Their role should also encompass coordinating monthly Technical Meetings at a cluster level, attendance at which is mandatory for all teachers.

During this research project, we interviewed a senior representative of DTMT in both Bavel and Thmor Kol districts. Our findings show DTMT visits to early grade teachers are very limited, and as a result, DTMT staff have a poor understanding of the needs of teachers and principals. One of the DTMT leaders reports visiting early grade teachers only once or twice per year, another was honest enough to admit he does not visit early grade teachers at all. Leaders of both DTMTs describe the mathematical knowledge of early grade teachers as only 'fair'. However, this is clearly a subjective viewpoint and cannot be considered to be entirely reliable given the minimal amount of visits they acknowledge they have made to the classrooms.

4.6.3 District Offices of Education

Interviews were conducted with senior representatives of DOEs in both Bavel and Thmor Kol districts. In reporting the results of interviews with representatives of the District Offices of Education, we have combined the results to give an overall picture of the two districts.

District Offices of Education in Bavel and Thmor Kol districts of Battambang Province are responsible for ensuring each school implements good quality teaching and school management practices. The DOEs coordinate educational services in each district, monitor and collect data, and provide support to teachers and principals via the DTMTs.

Both representatives reported a lack of budget to fund school visits, and a lack of resources. They also reported that they considered current training to be insufficient.

One district DOE has taken action on some of the educational issues, including sending a report to POE; encouraging DTMT staff to work as volunteers; and encouraging Technical Grade Leaders to support and visit teachers. Both district DOEs report having contacted the POE seeking support and intervention on teaching quality at early grades. In one of the districts, the DOE stated that the POE did not take any action, whilst in the other district, the DOE stated that the POE representative visited a school to observe teaching strategies but did not take any action as a result.

The DOE representatives recommend providing professional development training to teachers and principals on areas such as lesson planning and teaching strategies. In addition, they suggest training should be provided to principals and DTMT members, focusing on how best to evaluate and support teachers. The DOEs also advised identifying partner organisations with the skills to help teachers at a grassroots level.

4.6.4 Provincial Offices of Education

Provincial Offices of Education (POEs) are responsible for supporting the national ministry (MoEYS) promoting and regulating education. In each province, the POE is involved in implementing educational policies; preparing and submitting policies and plans for educational development; providing data and statistics, and employing and supporting teachers, principals and other staff.

Battambang Provincial Office of Education (POE) is responsible for delivery of education services in more than 550 public primary schools across the Province, 122 of which are in the research districts - Bavel (76) and Thmor Kol (46).

The POE representative interviewed for this research indicates the Provincial Primary Department checks and monitors the quality of teacher training provided by DTMT. The representative describes the mathematics knowledge, mathematical teaching strategies and skills of early grade teachers in the research district as being of a 'good standard'.

The POE representative acknowledged however, that the DTMT cannot provide sufficient training to early grade teachers due to budget constraints. In addition, funds provided by UNICEF and CDPF are not sufficient to provide any training for early grade teachers. We are unable to ascertain the total POE budget or how many training workshops were conducted last year. The POE representative suggests increased budget funds should be allocated to training. Due to time constraints, POE states it is unable to get involved in training at the national level.

4.6.5 Budgetary Constraints

Budgetary constraints emerged as a recurring issue for all stakeholders. Many teachers claim they need to work second jobs as their basic teaching salary is too low; principals do not have enough funds to provide basic resources; and district and provincial offices of education are unable to provide appropriate teacher training due to insufficient funds. Inadequate funding is clearly perceived as a contributing factor in poor teacher performance and ultimately inadequate educational outcomes for students at early grade level and beyond, although we note in particular that teacher pay has recently increased significantly. This aspect is discussed further in our conclusions.

5 Evidence from SeeBeyondBorders Programs in Cambodia

5.1 Development of SeeBeyondBorders approach

The World Bank (2017a), in its 2018 report on the 'learning crisis' in global education, suggests that more effort should be made to utilise processes that are found to work. The press statement that accompanied the release of the report, (World Bank, 2017b) said, "The report recommends concrete policy steps to help developing countries resolve this dire learning crisis in the areas of stronger learning assessments, using evidence of what works and what doesn't to guide education decision-making." The purpose of this section therefore, is to address the relevance of the work SeeBeyondBorders has been doing in the determination of QTLS interventions that can improve learning outcomes for children across Cambodia. It explores both successes and challenges that are relevant in scaling what has been to date a relatively small initiative in the context of a whole country.

Unsurprisingly, the findings from the research conducted specifically for this report are entirely consistent with the experiences of SeeBeyondBorders in the other districts where we have worked since 2009. It is findings like these that have underpinned our program design and to date these programs have had significant impact on both student achievements and teacher knowledge and skills. These programs have received international acclaim and support from the current Minister of Education. SeeBeyondBorders' quality teaching initiatives are an example of a suite of programs that work effectively to address the problem that children are not learning at school.

The hypothesis underpinning the QTLS initiatives we are recommending is derived in part from our experience that poor learning outcomes stem in the very first instance, from poor teaching practices. Both the research and the literature also identify that poor student test results are in large part, due to poor teacher knowledge and skills. The final question is then whether the corollary, improving teaching practice, will improve learning outcomes.

The mission of SeeBeyondBorders is to provide the best possible start to early-grade education through access to quality teaching and learning in schools. Our lead initiative is to train teachers, providing systemic change for primary school teachers through in-service professional development, supported by a structured mentoring program to build a community of professional learners.

SeeBeyondBorders designed its first early-grade (grades 1-3) teacher workshops in Cambodia in 2009. Visiting schools to evaluate the effectiveness of the workshops in January 2010, we determined that the knowledge and skills the teachers had learned were simply not being put into practice and the resources we had provided were not being used. Beginning in 2011, a comprehensive program of teacher mentoring and evaluation was instigated to support the learning from workshops, for teachers in the classroom. Since then, the programs have been modified and developed in collaboration with all stakeholders, based on practical experiences in rural schools. Since 2009, SeeBeyondBorders has worked with 523 teachers in 199 rural primary schools, providing 27,000 children with a better quality of education. During 2016/7, we worked with 256 teachers in 53 schools, who were responsible for teaching 7,154 students.

The design of our programs aligns with Guskey (2002) who argues that education standards are improved where professional development activities are designed with three major goals in mind:

1. To change teachers in-classroom practices;
2. To change teachers' attitudes and beliefs; and
3. To change the learning outcomes of students.

Our impact shows that this is possible in Cambodia with a low cost intervention, providing it is sustained over a period of six or more years. We refer to this approach as our SCALE model (Scaffolding Capability And Learning Experiences) which builds on Vygotsky's "Zone of Proximal Development" theory, developing teachers' understanding of the concepts they are teaching, their pedagogical (teaching practice) skills, and their ability to assess themselves and others.

5.2 Overview of the SeeBeyondBorders Quality Teaching Programs

Recognizing that sustainable change means changing attitudes and takes time, our Quality Teaching Program consists of three consecutive initiatives which run for up to 10 years, with a gradual release of responsibility to the participants as confidence and competence grows.

The initial three year "Core" teacher training phase focuses on building teachers' conceptual understanding and pedagogical skills through workshops run by trained SeeBeyondBorders' staff, who are qualified Cambodian teachers. We typically

train about 100 teachers in a group and from this group select and train more experienced and capable teachers to become professional mentors, providing regular in-class professional support to their colleagues. These mentors form professional communities of practice, meeting once a month to discuss challenges and achievements they face in their role as mentors and to share strategies and examples of good practice.

In the next or "Transition" phase, attention turns to developing teachers own sense of responsibility for their professional development. The focus is on further developing the mentors and to identifying senior mentors, teaching them how to run professional development and training programs for both existing and new teachers in their schools and clusters. In particular the program supports mentors to take responsibility for the professional development of their teachers, using the monthly mentor meetings to identify their teachers' needs and plan relevant and effective technical training sessions. They then facilitate this training in "Technical Thursday" meetings (a monthly gathering of teachers in their clusters to work together on the development of their skills). Senior mentors also develop the capability to run training programs for new teachers in their district.

In the final, or "Maintenance" phase, SeeBeyondBorders transfers responsibility for professional development to the DOEs, DTMTs, and the schools themselves. With the support of the DOEs, senior mentors can now run a series of training programs for new teachers to the district to address the continual cycle of new teachers entering the system each year. We are working with our first district in this phase, helping the DOE take on full responsibility for running the program, including in the schools we have not been able to reach to date. SeeBeyondBorders is training new mentors as well as DTMT members on how to train mentors.

In structuring these interventions, SeeBeyondBorders has utilised and looked to strengthen existing structures in the education system. These include:

- Using the existing curriculum and textbooks;

- Having qualified but non-teaching staff be the providers of mentoring where possible, linking with the existing responsibilities of school principals;

- Linking with members of the DTMTs to help them understand the scope of their responsibilities and including them and other DOE members in the training as they are available;

- Strengthening the Technical Thursday meetings so that they become effective teacher development opportunities addressing practical and current needs.

Where there are gaps in the system we have provided materials and support, but these have to be withdrawn in time as the system strengthens and can take ownership of its teachers' capabilities. In addition to the program itself SCALE provides:

- An evaluation framework for the development of teacher and mentor skills.

- An assessment process for students.

- Teaching resources and storage.

- A portfolio of community engagement programs (not covered in this report but vital to the improvement of education standards).

- Information gathering mechanisms to ensure mentoring takes place and teachers are assessed.

- Information gathering on levels of absence in teachers classes (again not discussed in this report).

- Regular professional mentor support.

The support that SeeBeyondBorders provides with these ingredients of the program is gradually withdrawn under the scaffolding aspect of SCALE, as the capabilities of teachers, mentors, and school management strengthen sufficiently to perform their roles independently and in a sustainable manner. We remain available to help and encourage.

5.3 Measuring impact

Evaluation is a critical element of SeeBeyondBorders' programs, and we have in place a testing regime for students, teachers and mentors to identify improvements in learning outcomes and the development of teachers' knowledge and skills. Through improving the quality of primary teaching, our programmes have contributed to increased student attendance,

improved student learning outcomes and higher retention rates. We have provided data below on learning outcomes. Other data can be provided on request.

5.3.1 Testing of student learning outcomes

SeeBeyondBorders conducts independent testing of the mathematics knowledge of all students in program schools. Tests are based on the relevant levels of the Cambodian mathematics curriculum and are set by SeeBeyondBorders staff. With the help of university students who are trained by SeeBeyondBorders staff, the tests are given to students on a predetermined day. Testing is invigilated by the students who collect and mark the papers and tabulate results which are subsequently used to provide feedback to teachers. Students who are absent are given a score of zero.

Our objective is for 75% of grade 1 and 2 students and 60% of grade 3 students to pass end-of-year mathematics tests by the end of the Core program. In July 2017, SeeBeyondBorders conducted tests and assessments on 4,750 students across our core programs, 87% of grade 1, 79% of grade 2 and 69% of grade 3 students passed these tests. Across all 7,141 children in our current programs the student pass rates are 85% of grade 1, 82% of grade 2, and 73% for grade 3.

5.3.2 Teacher assessment

SeeBeyondBorders has developed a scale to measure competency across six key teaching skills where an achievement at level 2 denotes competent across all six skill areas, and level 4 is exemplary in a Cambodian context. Each skill level consists of a number of required capabilities that together denote a particular level. Only on mastering all competencies in a given skill is a teacher awarded that skill level. There is no averaging.

The competency of teachers participating in our programs is assessed every six months through structured classroom observations. Our objective is to have 100% of teachers reach Level 2 (competent) by the end of the Core program (3 years). The results from assessments conducted in July 2017 show 99% of teachers in our Core programs have achieved at least Level 2, and 5% have achieved Level 4.

5.3.3 Mentor assessment

The skills of mentors are measured in much the same way as for teachers, with six monthly structured observations to assess competency against a scale comprising four skills, to be achieved at four levels. Our objective is to have 80% of mentors involved in the Core program demonstrate all requisite mentoring skills at Level 2, showing basic competency to collaborate, coach and advise. The latest results from assessments conducted in July 2017 show 98% of mentors achieved at least Level 2 (competent), and 7% have achieved Level 4 (exemplary).

5.4 Examples of Impact in two specific districts - Angkor Thom and Bavel

In this section, we provide more detailed information about our program in Angkor Thom and Bavel Districts of Siem Reap and Battambang provinces respectively. Schools in each of these districts have just completed the Core program, which was run over the last three years, so the results in these districts demonstrate the potential full impact of the program on teachers, mentors and students in other districts.

5.4.1 Student test results

Mathematics test results in Angkor Thom and Bavel districts demonstrate that substantive improvements can be achieved in student learning when teachers are given quality knowledge and skills training opportunities and are supported through mentoring to embed their learning into the classroom over a three year period.

During the three years (to 2017) of the program in Bavel, student test results achieved for Grade 1 improved from a level of 51% (our baseline) to 89%, in Grade 2 from 25% to 79%, and in Grade 3 from 16% to 79%. Note that the baseline figures are an aggregate across all districts at the commencement of the projects and do not specifically relate to Bavel. The results for 2017 are just for schools in Bavel. The 2017 results are similar to those achieved by other districts, except for grade 3 which was 55% for the least improved district.

5.4.2 Results for teachers

After three years of the Core program in Angkor Thom and Bavel districts, we have seen a dramatic improvement in teacher knowledge and skill. We began this program in 2014 with 19 schools in Angkor Thom district, Siem Reap Province and 16

schools in Bavel district, Battambang Province (none of these schools were examined in the research conducted for this report).

At the beginning of the project, the skill levels of teachers were broadly equivalent to those demonstrated by teachers evaluated as part of this research. In all our projects we assume that all the teachers start from a level of zero across all skills and the first assessment is then made approximately six months into the mentoring program. Initial mentoring workshops were conducted in the Angkor Thom in April 2014 and the first evaluation of teachers was completed in February 2015 showing only one teacher had reached level 1. As the following graph illustrates, after three years of structured and consistent professional development (the starting point of zero is not shown on the graph), teaching quality has improved significantly, with 98% of teachers now consistently performing at a competent level (Level 2 or above) in all six teaching skills.

Graph 17: Angkor Thom Teacher Scales 2015-2017
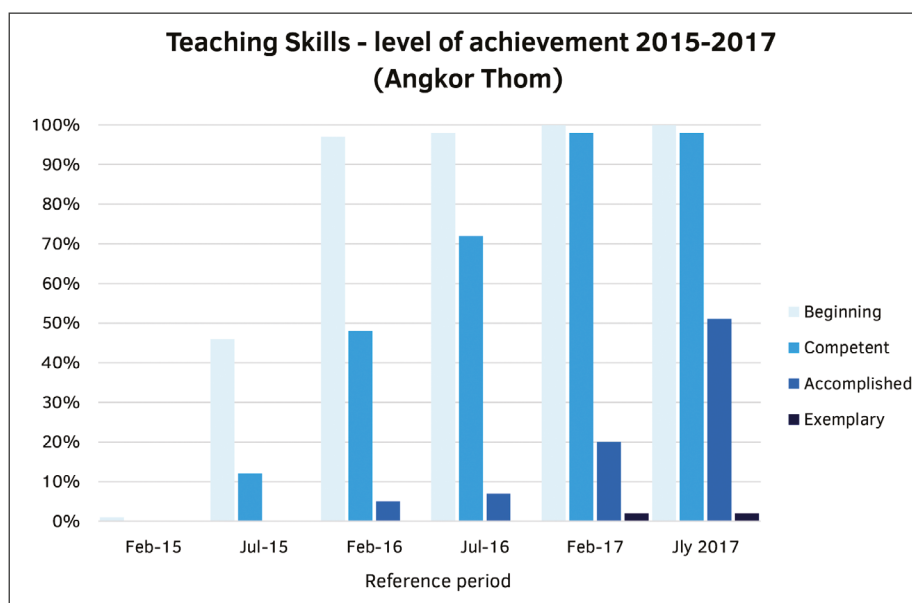
Teacher knowledge and skills improved in the same way in Angkor Thom as they did in Bavel schools. In the evaluations conducted in Bavel in February 2017, 100% of teachers were assessed as competent (achieving at least Level 2), compared with 30% in July 2016, and 2% reached Level 4 across all skill types.

5.4.3 Comparison of student test results with those assessed in the research

To ensure the test results in research schools could be compared with those for students in SeeBeyondBorders' program schools, the same testing methodology in this research was used as in the regular annual student testing. While students in SeeBeyondBorders' program schools were not tested as part of this research, the methodology was directly comparable: the same concepts were tested, the same mathematical strategies were required in order to answer the questions, and the questions were of the same level of difficulty. The administration of the tests, as well as data analysis and correction procedures used was also the same. The only significant difference between the tests was sample size, with 1,001 students tested in the Bavel and Thmor Kol research schools, and 3,000 students tested from other schools in Bavel who are in the SeeBeyondBorders program.

Graph 18: Impact of SeeBeyondBorders' teacher training on student test results.

Student Maths Test Results 2017
Schools with and without Quality Teaching Programs
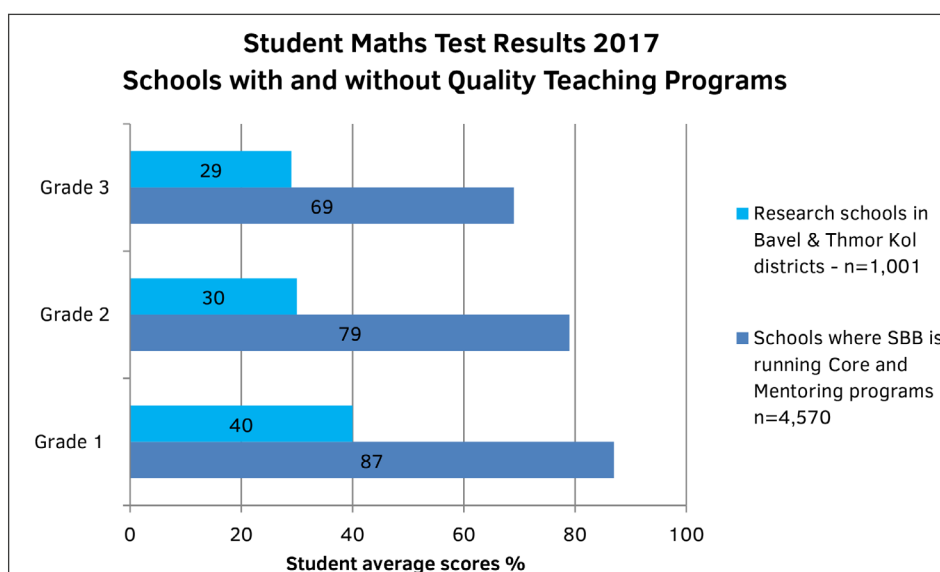
Average test scores of 87%, 79% and 69% for grades 1, 2 and 3 in SeeBeyondBorders' current Core programs in Bavel and Angkor Thom are in stark contrast with the scores achieved in the research schools of 40%, 30% and 29%. Students in schools where teachers have had the benefit of in-service training and ongoing mentoring, show over 100% improvement in mathematics tests than those in the research schools where no such training has been provided. This indicates a high correlation between improved levels of teacher competence, and student learning outcomes.

5.5   Lessons learned

The SeeBeyondBorders SCALE approach has been modified substantially since its beginnings in 2009 as a result of the lessons learned. The most important of these are that:

1. To be effective, workshops need to be relatively short and followed up with in-class support to help teachers put into practice what they have covered in theory and seen modelled.

2. Teachers need to understand how to build conceptual understanding grounded in concrete experiences and resource manipulation from which they can build children's conceptual understanding.

3. Interventions need to take place with a critical mass of schools. Teachers' learning is enhanced where there is a social process occurring and they can learn in a group through which they can build professional relationships and seek and find help, forming effective communities of professional practice

4. Successful mentoring is built on mutual trust and respect. Having teachers and mentors learning together builds an understanding of expectations in a trusting environment. Facilitated dialogue in a neutral and supportive environment where questions can be free flowing, irons out misunderstandings or particular difficulties with respect to curriculum content or classroom practice.

5. A set of clear expectations as to how practice can be developed and improved, is vital for scaffolding teacher development and communicating expectations. Teaching standards need to be supplemented with skill pathways that will lead to and demonstrate a standard.

6. DTMTs can play a vital role in system management and quality control. Their ability to establish relationships and demonstrate capability while offering encouragement and support as opposed to box ticking checklists will determine their success. Building skills in DTMT members will take time and application.

7. Teachers are willing to listen and are engaged by a persistent and personal approach to their development. A failure to build relationships negates all efforts at encouraging teachers to change their practice.

Achieving sustainable progress involves changes not only to teachers' behaviour but also the system that is charged with their recruitment, training, development, and management.

5.6   Challenges for scaling

While the SeeBeyondBorders SCALE system achieves a level of sustainability as DOEs take on responsibility for the learning outcomes of the students and the quality of teaching in their schools, continued momentum and a wider implementation of QTLS initiatives faces a number of challenges. Essentially these break down to resources, but how the resources are allocated is crucial to the success of the initiatives. To scale up the SeeBeyondBorders approach certain specific challenges have to be addressed as follows:

1. Identification and development of staff. To train staff to be competent and confident teacher trainers, takes several years of both study and coaching, on and off the job. SeeBeyondBorders invests significant resources on the development of its cohort of teacher trainers and scaling this to many times the current level would need dedicated, trained, capable personnel; sufficient resources; and careful planning.

2. As an extension of the first point, staffing in areas that are a significant distance from the main centres becomes an increasingly difficult problem to solve cost effectively as distance lengthens. While drop in visits have some effect, we found that even when working in Bavel, some 50kms from Battambang, we needed to open an office there and find staff willing to work from there during the week to build local relationships and understand local issues. This was much more challenging than in Siem Reap or Battambang requiring the provision of local accommodation.

3. A simplistic cascade model for training trainers does not bring about change in teaching quality according to Prigent (2016). Achieving change in teacher attitudes and beliefs and hence their behaviours requires persistent and focused interventions rather than any quick wins. Commitment for the QTLS initiatives will need to be beyond the shorter terms typically favoured by donors.

4. Systemic change is necessary to perpetuate the momentum created by smaller interventions and in this respect a number of policy developments from the Ministry need to be implemented at a district, cluster and school level as follows:

   a. Teacher mentoring needs to become a specific part of the activities in a school with time allocated to those responsible. This has implications for the availability of teachers and timetabling. However there are simple solutions available to this difficulty which in the short term can be inexpensive as we have found to be the case in the districts where our programs have been implemented.

   b. Teachers need to be rewarded for taking on additional duties and for achieving quality standards both in the short term and over the period of their career. The teacher career pathway (TCP) initiative will go a long way to addressing this in time, but the steps in a QTLS intervention plan need to be reflected in the development of a TCP model.

   c. A higher level of monitoring and management of QTLS initiatives are required so that systemic support is provided to mentors and they too have support with quality being recognised and rewarded.

   d. Current practices with resource management present a significant challenge to the development of teachers and needs addressing. They have significantly hampered our efforts on multiple fronts. Practices such as "promoting" teachers to higher grades, or moving qualified teaching staff out of the classroom to work in the library or the school office and replacing them with community teachers, are detrimental to learning and have meant that on occasions we have had to withdraw our assistance which is having limited effect and is not sustainable.

   e. The broader distribution of teachers is also an issue that the Ministry is well aware of and of course will have a major impact on the success of any scaling initiatives.

5. Assessment processes need to become institutionalised and not be the means for delivering reprimands but the basis for providing relevant assistance. Record keeping and data management are a cornerstone for an effective system.

5.7   Credentials

The credibility of any organisation's claims, opinions, or experiences is framed by that organisation's interests, governance, capabilities, and substance among other important factors. We have included at Appendix 2, a thumbnail of some of these issues as they apply to SeeBeyondBorders. More information will be supplied to interested parties if further validation is requested.

6   Conclusions

6.1   Macro view

The global 'Learning Crisis' as identified by UNESCO (2017 p. 21) amongst children at school, is a reality in Cambodia. This view is based on our own research and experience, as well as on that of other commentators. Whilst this is a result of a wide range of reasons, we have concluded that the most immediate is the poor teaching practice that stems from teachers' lack of knowledge and skills. ("Teachers are the most important factor affecting learning in schools" World Bank, 2017a, p. 10). It is no real surprise that this is the case in light of the poor quality of teacher training and the absence of in-service teacher development. Teachers have not had good teaching practice modelled to them, and are not able to conceptualise what good student learning might look like.

Overall, student learning is not being widely tackled at this point and the causes and effects may not be well understood. World Bank (2017b) says "The learning crisis is real, but too often education systems operate as if it is not. Many policy makers do not realize how low learning levels are. Others do not acknowledge them or simply equate low learning with low resources" (p. 83). In a Cambodian context this most likely stems in part, from the country's historical focus on schooling and not learning, as described in World Bank (2017a). However, it is undoubtedly also partially due to the vastly different perspectives of people who have had the opportunity to visit schools overseas, study or work in international or urban schools, and those teachers who work in rural schools with minimal access to guidance or resources. It is easy, as well as inaccurate, to write off such teachers as lazy. Demotivated, certainly, but not deliberately recalcitrant. The simple truth is that many teachers do not know how to do their jobs because they have never been taught or shown how to do so. Those vested with the task of improving learning need to implement the first of the strategies recommended in World Bank (2017a) and "assess learning to make it a serious goal" (p. xii).

Whilst not included in our research, we know through experience that there are a number of teachers who abuse the system and remain on the payroll, but are absent from their positions, while there is no systemic discipline to prevent this. There are certainly others that demand additional payments for supplementary lessons or favourable test marks. However, these points do not account for the poor learning outcomes and teaching quality witnessed by SeeBeyondBorders and evident from the EGRA and EGMA test results as reported by MoEYS (2016, p. 84).

Inevitably, there is a plethora of interconnecting reasons for this situation, many of which are historical and are now reflected in the levels of capability of staff throughout the education system. The questions are what to do about it, where to start and how to schedule interventions that are well conceived and delivered appropriately, as and when they are most needed. World Bank (2017a) calls this the second strategy, being to "Act on evidence to make schools work for learning" (p. xii).

Many of the more peripheral requirements for learning are receiving attention, from school buildings and infrastructure, to ECE (Early Childhood Education), scholarships, school based management, decentralisation, pre-service training, teacher career pathways linking to CPD, and the logistics around CPD providers. However, the central point, being what happens in the classroom in early grades, is not being substantively addressed and this risks all the other initiatives being rendered ineffective. It is our experience that most teachers are keen to learn, but also that they don't know what they don't know and need support and resources to help them to recognize what "good" looks like. Only then can they begin to reflect on their own skills and challenges; to work within a professional framework; and steadily improve the quality of their own teaching and therefore the outcomes for their students. This underlines the importance of the third of the World Bank (2017a) strategies which is to "Align actors to make the entire system work for learning" (p. xii).

In summary, the World Bank's advice (World Bank, 2017a, p. xii) to:

    i)   Assess learning to make it a serious goal;

    ii)   Act on evidence to make schools work for learning; and

    iii)   Align actors to make the entire system work for learning.

is entirely applicable to the Cambodian context where there is limited assessment, insufficient alignment of policy to address children learning at school, and a disparate set of views and hence approaches within the Ministry and DPs.

The following sections look at our conclusions component by component.

6.2 Student achievements

Student testing revealed very poor levels of understanding of the basic concepts included in the grades 1-3 mathematics curriculum. Pass rates (students achieving a mark of 50% or better) in grade 1 were 36%, falling to 7% by grade 3. Results get progressively worse as students miss key concepts. Gaps are not filled in due to teachers rigorously following the text books and introducing new aspects of the curriculum before foundational knowledge and understanding are developed.

With over 90% of children failing to reach a minimum standard by grade 3 the indication is that of those children who do stay in school, a handful at best will be able to pass independently set examinations of their basic ability by the time they get to grade 6. Further, given the economic pressures evident on the communities included in the study, there is little incentive for children to stay in school and every temptation for families to have their children take on work as soon as they are physically able to do so. This is a tragedy on many levels and is reflected in the Country's school dropout rates.

> **Repeated from Section 1.2**
>
> UNESCO (2017) concludes with respect to the current "learning crisis" identified in UIS (2017) that:
>
> "The data suggests the new numbers are rooted in three common problems:
>
> 1. First, lack of access, with children who are out of school having little or no chance to reach a minimum level of proficiency;
>
> 2. Second, a failure to retain every child in school and keep them on track;
>
> 3. Third, the issue of the quality of education being delivered in the classroom." (p. 21)

These circumstances link directly with UNESCO's conclusions as to the root causes of the current "Learning Crisis" (see adjacent text box). We can see in Cambodia that the low level of education being delivered in the classroom (Problem 3) also precipitates Problem 1, since given the high rates of student enrolment, those in school also have "little or no chance to reach a minimum level of proficiency". Further, these poor learning outcomes precipitate "a failure to retain every child in school" (Problem 2).

Although we did not specifically examine the correlation between dropout rates and learning outcomes in the research, it is clear from the literature review that students and their families become demotivated by low levels of achievement, and see no reason to continue in school where they are not acquiring the vital basic knowledge on which to build their learning and achieve in the higher grades. See Section 2.3.

It is worth noting that in our opinion, the grade 2 curriculum in particular would be challenging to cover in the time allotted, even in a more developed education system. The speed with which basic concepts are covered with minimal use of concrete materials, and the level of knowledge that is expected by the end of that grade, is exceptional. For example, in certain Western models it would not be expected that students could solve an algorithm of two or three-digit addition involving trading, without the use of concrete resources, until their third or fourth year at school.

6.3 Teacher Knowledge and Skills

This report does not seek to apportion blame for the crisis evident in learning outcomes. However, according to the Organization for Economic Co-operation and Development (OECD, 2005) "the broad consensus is that "teacher quality" is the single most important school variable influencing student achievement" (p. 7). The importance of both teacher and teaching quality is discussed in the literature review (Section 2) and identified, through SeeBeyondBorders' own work (Section 5), as a vital factor in educational outcomes for primary school students. This is not to dismiss other factors that are important in the researched districts where the communities are manifestly poor. Factors around poverty and social capital that translate to school attendance and parental engagement in student learning, are certainly relevant. However, no specific research was conducted for this report to determine the attendance rates in the relevant classes overall; the students' general level of health; or parents' level of education, all of which could have some impact on student outcomes. Our analysis focused exclusively on the students who were present on the day.

While there will be a number of factors that affect teaching quality, the underlying requirement to teach effectively goes to teachers' knowledge and skills, and in this regard, the teachers in this study fared very poorly. The results of the teacher knowledge test, comprising questions grades 1-3 students should be able to answer, demonstrate an inadequate understanding of basic concepts by the majority of teachers. 29% of teachers failed to achieve a mark above 50% in the test and the average score achieved was 65%. Further, classroom observations of teacher practice showed that only one of the 58 teachers in the research sample demonstrated competence in all six basic teaching skills assessed, and most teachers were unable to demonstrate any of these skills to any level of proficiency.

> "There is widespread agreement now that of all the factors inside the school that affect children's learning and achievement, the most important is the teacher – not standards, assessments, resources, or even the school's leadership, but the quality of the teacher. Teachers really matter."
>
> *Hargreaves, A. & Fullan, M. (2012).*

While there may be a range of reasons why teaching quality is low, our conclusions are based on the teaching performances we witnessed in each of the classrooms, with teachers in front of their own students. The results were not a function of teachers being absent, deliberately misleading their students, or simply not trying.

It is our assessment that the key reason for the weakness of the teaching observed was a lack of teacher knowledge and skills. Despite being 'qualified' as teachers, they just don't know how to teach. This conclusion is confirmed by the improvement achieved by teachers in SeeBeyondBorders programs (see Section 5) from its approach to teaching knowledge and skills. With the right training and support, teachers definitely have the capacity to learn to teach better and improve their student outcomes.

Simply not knowing what the problem is, or how to begin to address it, predictably translates to low morale amongst teachers and badly affects their attitudes to the day to day tasks of teaching. The research shows that teachers receive very few support visits to their classrooms, a situation which has the potential to leave them feeling isolated and overwhelmed. Beyond teacher pre-service and in-service development, other factors in the queue needing to be addressed, in no particular order, include: personnel management; teacher distribution; facilities available for teachers in rural and remote areas; teacher numbers; career development; teaching hours; learning facilities available to teachers and students; teacher and student resources; organisation of the teaching day to allow for absences; class sizes; and grade mixes. This list is not exhaustive but does illustrate the wider spectrum of challenges that face the education system today.

6.4   Systemic Support for Teachers

If knowledge and skills are the root of the problem, the question then becomes, why are they so limited, and what other reasons might contribute to the problem in particular schools and for particular teachers. Knowledge goes to what a person understands about a topic and can be learned in a classroom, but skills need practice, and opportunities to make choices and reflect on the consequences of those choices. Guskey (2002) refers to the process of learning for teachers as one that builds on witnessing achievement in students. Techniques that work are repeated and entrenched. Vygotsky discusses how learning requires the support of a "knowledgeable other" or a capable mentor perhaps, to help identify how and where students can achieve (as cited in McLeod, 2014, p. 3).

Teachers derive knowledge from their own life and educational experiences and from their pre-service training. Tandon and Fukao (2015), in their World Bank publication "Educating the next generation – improving teacher quality in Cambodia", concluded that even at that stage, the Cambodian teaching profession was attracting "a low calibre of enrolees" (p. 3) and their training left them poorly prepared and not provided with "sufficient content mastery and exposure to student centred pedagogy" (p. 7).

Skills would typically be enhanced through in-service teacher development, but the teachers in our research area reported that very little of this support was provided. Without a formal in-service program, a teacher may rely on guidance from a colleague or their principal, or even a member of the DTMT. However, we found these processes to be almost non-existent or weak at best. Perhaps it is not surprising that teachers' knowledge and skills are so low.

Even though school principals are meant to provide professional support, as are DTMT members, the majority acknowledged they provide support only rarely, if at all, citing administration workload as their main reason for not attending to this obligation. It is worth noting that MoEYS and UNICEF commissioned an external formative evaluation "Joint Formative Evaluation of Child-Friendly School Policy Implementation in Cambodia" (Shaeffer & Heng, 2016). This document concludes that while "the CFS [Child Friendly Schools] framework has been effective as a visible policy focused on quality education, and its checklist, a useful tool for school self-assessment and improvement…. due to inadequate funding and capacity and the inability to 'guide' schools through the process of improvement, the DTMT has not been effective as a CFS implementation and monitoring mechanism" (p. 26).

The view of teachers that they lack adequate initial and ongoing professional training and support, and have poorly resourced classrooms, is a view corroborated by the interview responses from school principals. Inadequate funding at a Provincial, District and school level is blamed for an inability to provide teachers with even basic mathematical resources,

or appropriate teacher training, ongoing professional development, or professional support. However, our experience suggests that poor knowledge and skills at multiple levels in the education system is generally the foundational problem. It is not necessarily simply lack of funding.

6.5   Management Structures

Cambodian teachers are often loudly and publicly criticized for having a 'poor attitude', with 60% of principals in the research project considering early grade teachers have a poor level of commitment. Our research suggests apparent low self-esteem levels and attitudes amongst teachers that are largely a result of lack of confidence in their own skills and ability to teach effectively.

When both teachers and principals were asked about challenges faced by teachers, the results showed a sizable gap between their respective perceptions. These differences suggest a lack of mutual trust and little notion of working in collaboration towards a common goal. Principals expressed some resentment over a perceived casual or less professional attitude amongst teachers. Observers concluded that this stemmed from two points:

A.   A sense of isolation amongst teachers and a belief that they were doing their best under difficult circumstances with very little support; and

B.   A sense of frustration amongst principals at their lack of authority over teachers and their lack of ability and resources to help teachers when they, as principals, carry the responsibility for the teachers' actions or inactions.

The biggest challenge survey participants identified was a lack of access to research tools and resources, and on this issue, teachers and principals agree. Teachers feel ill-equipped to teach the lessons. Many schools have very poorly resourced libraries and the majority of teachers have no or very limited internet access. In an environment where teachers get so little training and development, any access to self-development is effectively closed, not only because of the lack of resources, but also because teachers do not possess research skills and are unable to find appropriate supporting materials.

While enormous amounts of work are being conducted in Phnom Penh in conjunction with the Education Strategic Plan and the Teacher Policy Action Plan by engaged, enthusiastic and informed individuals, there is an almost unbridgeable disconnect with the actual situation on the ground. In the provinces, education authorities generally have no clear vision of what they are aiming to achieve or how to identify or prioritise initiatives that are likely to move the system forward. Policies developed by the Ministry are simply not being implemented or are not understood. Teacher Professional Standards is a case in point. While efforts are underway to bring cohesion within the donor community as to priorities - while putting MoEYS in the driving seat - fragmentation of effort and the need for quick wins continues to hamper progress, and there is little apparent change occurring at the grass roots.

Tan and Ng (2012) observe that innovations in the Cambodia education system "are not implemented in the classroom due to a lack of structural support...[and] contextual restraints...such as large class sizes, limited infrastructure and resources, and lack of support from school leaders and colleagues" (p. 128). We agree, and would add that there seems to be no culture of support for quality teaching and learning. Perhaps this stems from a lack of awareness of what constitutes teaching quality. In our research, although nearly two thirds of principals (65%) predicted 90% of their students will not pass the mathematics test at the end of the year, 70% described grades 1-3 mathematics teaching in their school as 'good'.

6.6   Appropriate Training for Teachers

In relation to professional teacher training and support, a key consideration is how the current education system reform process proposes to address the complexities around future pre-service and in-service teacher training programs. Whilst examination of the detailed design of training programs is outside the scope of this project, it is relevant to note that as part of teacher education in general, there is a need for an established, strong, and well-functioning system at a school level that is capable of providing an appropriate training ground for trainee and graduate teachers in their practicums as they begin their careers as teachers.

If the continued training of fledgling teachers is to be effective beyond the fence of the teacher training colleges, and schools are to be supportive of ongoing quality teaching, then priority must be given to establishing a strong training and mentoring program for the teachers already teaching. This will ensure that good quality teaching can be modelled by the current teachers in schools when new teachers arrive. Only in this way will new teachers, on graduation, enter a professionally supportive environment.

As discussed in Section 2.2, the World Bank study (Tandon & Fukao, 2015) identified poor quality preparation for trainee teachers as a constraint to a high quality teaching workforce and suggested three pillars for remedial action being: making teaching a more attractive profession; improving teacher preparation; and encouraging stronger classroom performance. We fully endorse these recommendations, however believe that the priority is not new teachers entering the system, but teachers who are already within the system and have not already been adequately trained. The Government should be wary of opening up too wide a front on immediate reforms, given the enormity of the task it faces. Tackling the existing workforce is the bigger problem, and new teachers entering each year are a small fraction of the entire workforce.

Clearly, there is a requirement for urgent action to address the issues around the quality of teaching in Battambang Province, and it is fair to assume that these same issues are reflected in many other provinces in Cambodia. It would be expedient to review and embrace advice from the World Bank (2017b) and use "evidence of what works and what doesn't to guide education decision-making".

7   Recommendations

7.1   Approach to making recommendations

The work conducted in this project raised a wide range of issues, but in keeping with its aim, to identify priority interventions to address how to improve the quality of teaching in Cambodia (the QTLS interventions), we focus in this section on recommendations to improve teaching quality, and in turn, to get children learning when they are already in school.

We are mindful of resource limitations and of the time it will take to change practice in a sustainable manner, as well as the deluge of recommendations made recently across all aspects of the education sector by those with the financial backing to implement their agendas. Therefore, we have concentrated our recommendations on actions to address what we argue are the most basic and immediate requirements to begin the process of improving the quality of education, so as to have children already in school meeting the minimum proficiency levels (UNESCO 2017), at least in early grades, in Khmer and mathematics.

To achieve this, a change to the blend of interventions currently being focused on by the Ministry is recommended while bearing in mind the importance of "using evidence of what works and what doesn't to guide education decision-making" World Bank (2017b). Of particular importance, is looking at what does (and doesn't) work in a Cambodian - not just a global - context.

A plan to address the learning crisis will include defining what each of a series of steps should 'look like' to address the central causes of that crisis so that:

a)   teachers can understand how to progress from where they currently stand, towards quality teaching; as well as

b)   what has to be in place systemically to allow all teachers to build a solid foundation of subject knowledge and pedagogical skills.

Our recommendations are deliberately framed at a systemic and not at a local level. We have not attempted to define detailed local interventions and design localised projects through this report. Rather, we have attempted to set out a structure that the Ministry, Development Partners, and other organisations whose goals are aligned with the broad principle of improving learning might agree on and link more localised interventions to. In this way, even a patchwork approach to implementation has a common theme, structure, and aim and can integrate, in time, to the Cambodian National approach as this is developed. The World Bank (2017a) warns against simply applying solutions lifted from other countries when it says, "the need for coherence makes it risky to borrow system elements from other countries" (p. 13) and "improving learning in a particular setting will never be as simple as taking a successful program from one country or region and implementing it elsewhere" (p. 20).

Reflecting these points we have approached our recommendations in three sections. The first sets out the framework of interventions we recommend are implemented, being the QTLS interventions. The second recommends a process for getting started in this endeavour; and the third details how the recommended approach addresses and integrates with approaches identified by the World Bank and by McKinsey, as being appropriate bearing in mind the current situation in Cambodia.

7.2   The QTLS Interventions

Coherence and integration is a theme for the QTLS initiatives which in summary are as follows:

1.   **Build teacher knowledge and skills** - Teachers need the subject knowledge and pedagogical skills to be able to teach, requiring that a program to build basic teaching capability be established.

2.   **Establish mentoring** - Effective teacher professional development requires "significant continual support—not one-off workshops" (World Bank, 2017a, p. 132) – amongst other things. Back up and technical support in the classroom is essential for putting into practice newly acquired knowledge and skills.

3.   **Introduce teacher performance incentives** - "Teachers need to be treated as professionals, and good professionals receive support and respect, but are also held to high expectations. A system that does not pay attention to what its teachers are doing does not afford teachers the respect they deserve" (World Bank 2017a, p. 136). These incentives may be relatively simple in the first instance, helping teachers to fortify their intrinsic motivation as developments on TCP progress.

4. **Reinvigorate DTMTs** - "The fact that another person may observe their performance offers a form of professional motivation. So do evaluations, where teachers expect their performance to be assessed" (World Bank, 2017a, p. 138). DTMTs can offer invaluable support and quality control to a system that is developing.

5. **Set targets, gather data, and perform assessments** - "A lack of good measurement means that education systems are often flying blind - and without even agreement on the destination." (World Bank, 2017a, p. 112). There is little to add in terms of the importance of this intervention to help steer learning across all aspects of the work of students, teachers and the system itself.

6. **Develop and distribute learning resources** - Good teaching practice, perhaps particularly in early grades, requires a variety of teaching and learning resources which are all but absent in many of the schools where SeeBeyondBorders conducted its research or has worked. These do not need to be overly expensive, but making some inroads on equipment in schools is essential, allowing students to have hands on, practical experiences of concepts rather than simply rote learning and chanting.

7. **Assist low performing schools (Deemed priority 2)** – Inevitably there will be those schools that struggle and the system needs to be geared up and structured so that it can help.

8. **Improve Human Resource Management** – This initiative goes to the amount of time on task that is available to students. It would make a significant impact if this could be increased, but that would involve not only addressing inefficiencies in the schools, but also structural factors that allow or require all those in the education system to work on matters that are not focused on learning in schools, as well as the wider problem of the distribution of qualified teachers in the system. (Just two small examples of practices that are not focussed on learning are: firstly having qualified teachers working in the school office or as librarians while contract or community teachers teach in class; and secondly the notion that teachers are "promoted" to higher grades. Early grades are the key to improved learning).

These interventions are interdependent and have significant areas of overlap. Training is at the core with support from mentoring and learning resources. Mentoring is supported by the DTMT reinvigoration. All processes are subject to targets, data and assessment which will likely of itself need input from training as will mentoring and DTMT members, but these metrics will guide incentives, support for low performers and better resource management.

Diagram 1: Interlinking of QTLS Interventions (repeated from Executive Summary)
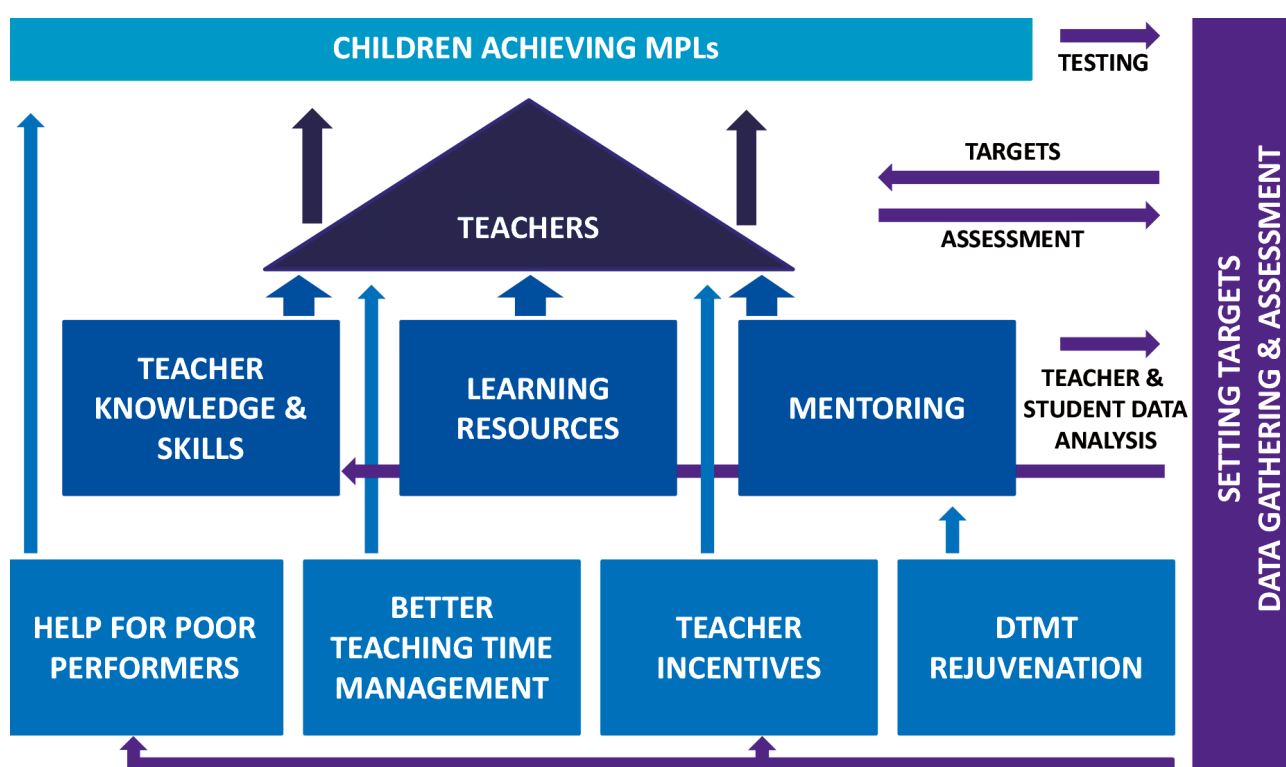
As well as being derived from the research included in this report and SeeBeyondBorders' wider experience, these recommendations link to what the World Bank (2017a) describes as what "struggling education systems lack, [being] one or more of four key school-level ingredients for learning:

    I.   Prepared learners,

    II.   Effective teaching,

    III. Learning focused inputs, and

    IV. The skilled management and governance that pulls them all together." (p. 9)

We acknowledge the efforts the Ministry is making with regard to "prepared learners" (I above). However, MoEYS (2016) says that "The program of expansion of pre-school classrooms undertaken by MoEYS in the past years and the growth of community pre-schools allowed enrolment in pre-primary education to grow by 2.5 times since 2007/08... However... Just over 19 per cent of children 3-5 years old are registered in ECE services, but attendance is lower especially among poor families and in rural areas" (p. 6).

The other three factors, being effective teaching, learning focused inputs, and skilled management and governance are exactly the factors addressed in the QTLS interventions in the context of early grade education.

7.3   Recommendations on where to begin

The World Bank (2017a) suggests a process for setting about the task of addressing the learning crisis involving assessing the situation, acting on evidence, and aligning the system towards learning. We recommend adopting this approach in the first instance to ensure the learning crisis becomes visible and interventions gain widespread support.

Repeated from Section 6.1
The World Banks advises (World Bank 2017a p. xii) that education systems should:

i)   Assess learning to make it a serious goal;

ii)   Act on evidence to make schools work for learning; and

iii) Align actors to make the entire system work for learning.

Projections into the future are of course vital at Ministry level, but schools and teachers in Cambodia need explicit instructions as to their most immediate next steps to address quality. It is important schools and teachers are provided with clear, achievable objectives, as well as the support to help them achieve those objectives if inroads on Minimum Proficiency Levels are to be made.

We recommend the following approach be taken:

7.3.1 Assess Learning

Conduct additional research and assessment specifically targeted at identifying the extent to which students are or are not meeting MPLs.

As already identified, reliable assessment of learning is limited and in order to galvanise the resources necessary to make a QTLS intervention successful on a National scale, there needs to be greater understanding of how widespread the difficulties are, so that priorities can be identified. Romer, cited in World Bank (2017b) states: "The only way to make progress is to 'find truth from facts'". We recommend that is the starting point.

7.3.2 Make schools work for learning

Begin with a set of targets which address learning shortcomings (based on the learning assessments referred to in 7.3.1 above) to which interventions are then aligned. Relate these to achieving MPLs.

Part of the challenge when designing interventions is that many teachers and principals do not have a good grasp of the issues within the education system that hinder quality education or what to do about them. There is a significant problem with how to demonstrate to teachers, principals, and those with the responsibility for broader education management, what good teaching looks like, what they should be aiming for, and what could be achieved nationally as a result. An understanding of what is being aimed at, forms the bedrock on which to build interventions that have the potential to be sustainable.

Work in this area has already been done in the form of the current Teacher Standards, for example which provide an absolute statement as to what is expected of teachers, and form an important step towards establishing teacher and teaching quality. However, a set of guidelines as to how each statement is to be demonstrated, and a pathway to achieving that standard, are necessary if teachers are to project themselves to the point where they can envisage mastering such capabilities.

Aligning targets between interventions is critical to providing clarity for teachers. Acknowledging the importance of the Teacher Career Pathway initiative, we recommend this remain an open piece of work for the time being and that it be informed by the QTLS initiatives and the targets for learning established under this recommendation.

School-based management, a further vital initiative, should also be focussed at this stage on the management of teaching quality and should integrate with the QTLS initiatives. World Bank (2017a) suggests "focus[sing] school management and governance reforms on improving teacher-learner interaction. Training principals in how to improve that interaction—by providing feedback to teachers on lesson plans, action plans to improve student performance, and classroom behaviour— has led to a large impact on student learning" (p. 23).

Teacher career pathways

Aligning Education System targets to other interventions is critical to providing clarity for teachers. For example, the progression of capability as discussed in this section should translate into the basis of the teacher career pathways.

Currently, a points accumulation system is being considered and we caution against this in isolation. Professional standards and professional obligations are two different considerations, and undertaking CPD should be a professional obligation with a number of hours mandated in various forms, at different levels of seniority. However, skills need to be practiced and demonstrated and this should be an integral part of any system that determines a teacher's seniority.

7.3.3 Align actors

De-prioritise initiatives around pre-service training, and the implementation of a *continuing* professional development (CPD) system, to focus first on the immediate priority of establishing a *basic platform* of professional knowledge and skills of current teachers.

It is our recommendation that activities related to PRESET and CPD are re-scheduled so that the priority focus is on securing basic teacher competence in relation to foundational knowledge and skills for all teachers currently in the system. This would ensure that any subsequent CPD initiatives are building on solid foundations, and that new graduate teachers enter a system that models professionally sound practice and is able to support their professional growth effectively. We recommend that initiatives to improve the competence of current teachers involves representatives across the system, including individuals most concerned with teachers: members of the Ministry's team; relevant POE and DOE staff; school teaching and leadership staff; and potentially the PTTCs. We are not suggesting that any of the existing initiatives should be abandoned. On the contrary, we commend the work being done across a wide area of initiatives. However, aligning the understanding across the system, of what constitutes 'quality teaching' in the classroom, and establishing this quality, is essential, as this is the standard that should inform any subsequent initiatives.

We note, as reported in Phnom Penh Post on Monday 30 October, the Government's proposed 2018 budget allocation to education is $818 million, a 24% increase from 2017. Such a budget increase would constitute an excellent step towards marshalling further resources and would further confirm the Government's commitment to improving education. However, this does not change our recommendation in relation to the availability of suitably qualified and experienced individuals, who are in short supply, to lead a QTLS initiative. Additional funding may go to redress this constraint in time.

We acknowledge the difficulties to changing priorities in the manner being recommended and the difficulties for the DPs to support this change in prioritisation, given their own programs and funding. However, if they were to act together, it would be possible to also encourage other NGOs to collaborate in this initiative and allocate resources to assist with this work. It would be necessary to give them a seat at the table when National developments are discussed and debated.

Changes to the intervention implementation timetable need only be temporary. Deferring initiatives such as those aimed

at pre-service training and CPD for just one or two years while prioritising QTLS interventions, will greatly help Cambodia step smoothly through stage one and into stage two of its own improvement journey. However long it takes, we recommend that the Ministry focuses its efforts in the area of Teacher capability since an ability for students to meet MPLs will underpin so many of the important later interventions that will become priorities in the future.

7.4   Guiding principles underlying QTLS interventions

The Literature Review informed this project in many respects, the key areas being:

- That quality teaching is the most important factor in the learning of students.

- The process by which teachers learn to teach better.

- That the most appropriate educational interventions for Cambodia are determined by the stage its education system has reached on its improvement journey, and by the level of professional development achieved by Cambodian teachers on a scale of mastery of subject knowledge and pedagogical skills achieved.

- The most effective way to structure effective professional development for teachers, and in particular the importance of mentoring.

In framing the recommendations on improving learning outcomes, focus has been placed on teaching quality, and hence on teacher knowledge and skills, and the key support structures that nurture this approach. In particular, we have considered how teaching quality might be achieved given the current context in Cambodia. However, in the competitive environment for relevance in the education development space, and given that we have already identified that the Ministry has what we judge to be a most ambitious agenda, we have been concerned that these recommendations risk getting little if any attention.

Our own experience and the literature, tell us that addressing learning outcomes is critical to Cambodia and its future. Therefore, to add authority to our recommendations, we have contextualised them by linking them specifically to interventions identified by the McKinsey report (Mourshed et al., 2010). This report analysed the interventions found to be successful in education systems moving through each particular stage of their learning journeys. We have selected those interventions that are appropriate based on where the Cambodian education system currently stands on its own improvement journey, assuming that it will aim to prioritise achieving at least the minimum proficiency levels (UNESCO, 2017) in grades 1 to 3.

The McKinsey report (Mourshed et al., 2010) states, "Characteristics [of interventions] change over time, depending on what stage of the journey the school system has reached. In the early days, outcomes improvement is all about stabilizing the system, reducing variance between classrooms and schools, and ensuring basic standards are met. At this stage of the journey, the reforms are almost always driven from the centre. Later, as the system improves, the engine for improvement shifts to instructional practices. This, by its very nature, has much less to do with the centre and is primarily driven by the teachers and the schools themselves: it is all about turning schools into learning organizations… It is all too easy to confuse what is needed at one stage with what is necessary at another, quite different, stage" (p. 111).

> The "poor to fair" journey: achieving basic literacy and numeracy. (Mourshed, et al, 2010).
>
> "The systems in our sample moving from poor to fair confronted five main challenges at the outset of their improvement journey. First, due to the challenges inherent in the place they start from, their teachers and principals were less experienced and less motivated than in systems further along the journey. Second, the governing education bodies had little capacity for supporting and managing schools; this problem was all the more acute due to the large size of many of these systems. Third, performance varied widely between schools in a particular system. Fourth, only limited resources were available for the improvement program (both human and financial). Fifth, the levels of student literacy and numeracy were low, and the level of absenteeism significant." (p. 29)

In the report "Teacher Capacity Development in the context of Whole System Reform for Cambodia", Shuttleworth (2016b) identified that "In the schools where SeeBeyondBorders works, being rural schools, it is our judgement that the focus of our work initiates in the [McKinsey & Co.'s first stage] 'Poor to fair' stage which the Report has as its theme, 'Achieving the basics of literacy and numeracy'" (p. 3).

The table below provides a summary of how our QTLS intervention recommendations link to the themes and intervention descriptions as used in the McKinsey report (Mourshed et al., 2010, p. 30) for education systems moving from the 'Poor to fair' stage on their improvement journey. In this summary we have added a column to link the McKinsey descriptions to the interventions we have recommend in Section 7.1.

Table 8: Intervention Recommendations (Based on McKinsey & Co.'s Report 2010)

THEME	DESCRIPTION (McKinsey)	INTERVENTIONS (SBB)
A. **Providing scaffolding and** **motivation for low skill teachers and principals**	**Scripted lessons:** The system creates instructional objectives, lesson plans, and learning materials for daily lessons to enable teachers to execute lessons rather than devise them. **Coaching on curriculum:** The system creates a field force of coaches to visit schools and work with teachers in-class on effectively delivering the curriculum. **Incentives for high performance:** The system gives rewards (monetary and prestige) to schools and teachers who achieve high improvement in student outcomes against targets. **School visits by centre:** The system's central leaders/administrators visit schools to observe, meet and motivate staff, and discuss performance. **Instructional time on task:** The system increases student instructional time.	**1. Building Basic teaching capability** **2. Mentoring** **3. Teacher performance incentives** **4. DTMT reinvigoration** **Covered under 8. Human Resource Management**
B. **Getting all schools to minimum quality standard**	**Targets, data, and assessments:** The system sets minimum proficiency targets for schools/students, frequent student learning assessments (linked to lesson objectives, every 3-4 weeks), and data processes to monitor progress. **Infrastructure:** The system improves school facilities and resources to a minimum threshold adequate for attendance and learning. **Textbooks and learning resources:** The system provides textbooks and learning resources to every student and teacher. **Supporting low performing schools:** The system funds targeted support for low performing schools.	**5. Targets, data and assessment** **Not prioritised** **6. Learning resources** **7. Low performing schools**
C. **Getting more quality teaching time**	McKinsey calls the theme here "Getting more students in seats" with the following interventions: **Expand seats:** The system increases school seats to achieve universal access. **Fulfil students' basic needs:** The school provides for student basic needs to ensure that more students attend school and that absenteeism declines. We have modified the theme as below but continue to address the issue of resources being brought to bear to provide teaching time. **(Mourshed et al., 2010, p. 30)**	**8. Human Resource Management** **Not prioritised – see section 7.6**

Mourshed et al., (2010) include interventions in the first stage of an improvement journey (see section 2.5 Formulating effective and contextually appropriate interventions) that go to infrastructure and access to education under Themes B and C as identified above. We have not included these themes in the same manner in our recommendations given that

infrastructure and access have already been prioritised by the Ministry and the learning component of this stage is now the priority. The QTLS interventions concentrate on the quality of teaching and learning aspects of this part of the improvement journey, and accordingly we have modified the third of the McKinsey themes from "Getting students in seats" to "Getting more quality teaching time". This intervention therefore continues the "quality" theme (Theme A), linking with McKinsey's "Instructional time on task" intervention under that theme. The parallel with McKinsey's theme C in intervention number 8, arises through its initiative to mobilising resources more efficiently and have them allocated to providing students with more teaching time.

7.5   QTLS Initiatives – Further details

The following table, table 9. Provides further details on the specific initiatives we are recommending.

Table 9: Detailed Intervention Recommendations (Based on McKinsey & Co.'s Report 2010)

THEME	INTERVENTION DESCRIPTION
A. **Providing scaffolding and motivation for low skill teachers and principals**	**1. Building Basic Teaching Capability (Priority 1)** Referred to by McKinsey* as "Scripted lessons" this intervention has to tackle the basic knowledge that teachers have of the subject material they teach as well as the basic skills required to teach it. We are not advocating a Bridge International Academy style of intervention such as is employed in a number of countries in Africa where Education Ministries have outsourced parts of their basic education systems to private contractors who employ a highly scripted approach to delivering lessons. However, at this stage teachers do need to be able to deliver basic lessons effectively and deliver them in a sequence that corresponds to the progression of a student's learning. Teachers currently spend very little time in any form of lesson preparation and it is not effective to simply place the onus on them to do more. They need detailed guidance. The existing textbooks provide a good general progression for the mathematics curriculum although there are a number of the concepts included that teachers do not understand. It is not effective as a lesson script and supplementary material is required. We recommend that this intervention involves a series of workshops that focus on teaching the topics covered in the syllabus, breaking each concept down by their component concepts. This training should be supplemented with material that rounds out the text books and includes example activities for use by teachers in mathematics lessons. A similar approach should be taken for literacy in conjunction with the current reorganisation of the curriculum that is being discussed as part of the Ministry's current project as coordinated by RTI. We recommend that training be given by individuals who have themselves both been through a training program and have subsequent experience of using the knowledge they have accumulated in a teaching environment themselves. We are not suggesting that a cascade model be applied. Identifying individuals who have the capabilities necessary to run this training will initially be challenging, but their involvement is essential. McKinsey* describes this process as "The system creates instructional objectives, lesson plans, and learning materials for daily lessons to enable teachers to execute lessons rather than devise them." This initiative needs to link closely with the second – Mentoring.

THEME	INTERVENTION DESCRIPTION
A. **Providing scaffolding and motivation for low skill teachers and principals continued**	**2. Mentoring (Priority 1)** Referred to by McKinsey* as "Coaching on curriculum" this involves "The system creating a field force of coaches to visit schools and work with teachers in-class on effectively delivering the curriculum". This describes exactly the intervention that we recommend. It must link with Building Basic Teaching Capability (Intervention 1.) so that teachers have help to implement what they have learned in a workshop setting, in their classrooms with students. We envisage that this will also link with Intervention 4, and be part of a process to reinvigorate the DTMT model which will then provide oversight, technical support, and monitoring of the Mentoring function in each district. Mentors, senior mentors, DTMT members and technical support providers from the POE or the PTTC, should participate in, or give, the training referred to in 1 above, together with their teacher colleagues in order to form relationships with their cohort that are grounded in a shared professionalism. Mentors would need to be developed further and undertake a series of mentor development courses. A key component of the mentor development program will be to teach evaluation processes and get a shared understanding of what "Good practice" looks like. It will be necessary to drive the mentoring at both a school and a cluster level, establishing a hierarchy which will be reflected in different training structures and include DTMT staff who will be responsible for supporting the Mentoring process and for providing quality assurance. **3. Teacher Performance Incentives (Priority 1)** Referred to by McKinsey* as "Incentives for high performance" this involves "the system giving rewards (monetary and prestige) to schools and teachers who achieve high improvement in student outcomes against targets". This intervention recognises the importance of commending teachers and schools for outstanding performance, from the outset. An incentive program is an important tool for achieving buy-in from teachers, encouraging them to upskill and try new ways to teach. While recent teacher pay rises have limited the opportunities for differentiation, a truly merit based system that provides recognition to the community and colleagues can be an important motivator. This intervention is a precursor to the implementation of the teacher career pathway policy but is fundamentally different from the current teacher awards system which is about everyone getting a turn, and which is not believed by teachers to be merit based. The proposed system will be required to dovetail with the teacher evaluation process that will underpin the Mentoring program (Recommendation 2) and also to link with student outcomes so that exceptional performance can be identified and rewarded. **4. DTMT Reinvigoration (Priority 1)** Referred to by McKinsey* as "School visits by centre" and involving "The system's central leaders/administrators visiting schools to observe, meet and motivate staff, and discuss performance", we see this as a key adjunct to the Mentoring system (Intervention 2). The key to a successful intervention here is to ensure that members of the DTMT build constructive relationships with the schools and the mentors they need to support as already outlined under Intervention 2. While the key job of DTMT members will be to support and develop the Mentoring program, part of their role will certainly be monitoring and quality assurance. An evaluation system will be required to identify good mentoring and to assess mentors, and in that regard, there should be a link with the PTTC and experienced teacher trainers who can support DTMT members. This group would be charged with oversight of the incentive program (Intervention 3).

THEME	INTERVENTION DESCRIPTION
B. **Getting all schools to minimum quality standard**	**5. Targets, Data and Assessment (Priority 1)** This intervention recommendation, which McKinsey* describes as one where "The system sets minimum proficiency targets for schools/students, frequent student learning assessments (linked to lesson objectives, every 3-4 weeks), and data processes to monitor progress" is a high need and will be a particular challenge to implement. The major hurdle will be to gain the trust of teachers and school principals so that they will be honest with the data they provide. The second challenge will be to provide instruction on assessment criteria, test design, and data management. No doubt these issues are already being addressed under the Ministry's School Based Management interventions which we recommend are, for the time being only, restricted to only supporting the QTLS interventions. This intervention goes beyond the context of measuring student achievement, although that is key to determining the overall impact of the QTLS interventions. It is the enabling intervention for measuring progress on all other interventions under the QTLS heading, including improving the knowledge and skills of teachers and mentors. This intervention will therefore involve the development of a broad range of criteria, a training system to introduce it to all stakeholders, and then a management system to ensure the data is used to inform and guide all those involved. The aim here is to see principals engaging better with teachers on a platform of common understanding. Interventions should be designed to emphasise Monitoring and Engagement and not just Monitoring and Evaluation. **6. Learning Resources (Priority 1)** Referred to by McKinsey* as "Textbooks and learning resources" requiring that "The system provide textbooks and learning resources to every student and teacher" this intervention is self-explanatory but challenging to implement. No doubt there have been a great many resources prepared by NGOs, a number of which have been approved by MoEYS. However, more effort is needed to identify suitable resources which will be used in conjunction with the training recommended under Intervention 1. "Building Basic Teacher Capability". In particular, materials are required: i) to guide teachers through the requirements of teaching the syllabus for the relevant year groups; ii) for students to give them concrete experiences of the abstract concepts they are required to learn in mathematics; and iii) for literacy, where students need to be "immersed" in literature and have multiple opportunities to engage with texts of an appropriate level - meaning there is a high level of need for reading books, posters and charts that teachers can use to promote a love of literature. **7. Low Performing Schools (Priority 2)** Referred to by McKinsey* as "Supporting low performing schools" and requiring that "the system funds targeted support for low performing schools", McKinsey recognises the need to encourage the system at a school by school level. This intervention is predicated on a means of identifying low performing schools, so a measuring system needs to be in place (Intervention 5.) This initiative has a level 2 priority, recognising that identifying the low performing schools will require the development of a performance measurement system under Intervention 5 first. We suggest this intervention to support low performing schools, utilises student testing results to identify the overall school performance and that any "targeted support" considers both teaching quality and school management to identify where support from DTMTs and the PTTCs, is required. Where individual schools are supported, targets need to be set to identify what subsequent improvements are anticipated and what actually comes to pass. The success of this intervention depends on there being adequate resources in the system to provide the necessary support and this too is a particular challenge in the Cambodian system.

THEME	INTERVENTION DESCRIPTION
C. **Getting more quality teaching time**	**8. Human Resource Management (Priority 1)** McKinsey* includes an initiative described as "Instructional time on task" requiring "increased student instructional time" under the Theme A. We have included this here under Theme C with the aim of extending time on task by increasing overall quality instructional time provided to students through: i) longer teaching days; ii) better organisation within the day; and iii) qualified teachers being in class, requiring improved management of resources. This intervention relies on both improved and better managed resourcing, given the link between instructional time and teacher numbers, class sizes, teacher distribution and task allocation, timetabling, and the mixing of grades. An increase in the productive and organised time qualified teachers have to dedicate to their students is needed. Many schools for example, a key educational asset, are simply not utilised in the afternoon. Further, the current number and distribution of teachers by district and within roles within a school, represent significant barriers to increasing the quality of attention children receive in school, making it a priority issue to be addressed from both a learning and a financial point of view. We are not qualified to offer detailed suggestions in this area without conducting additional research. Anecdotally, we know resourcing is a challenge, and is not an area that can be influenced from outside the system. We know the Ministry is fully aware of this, and of the costs to the education system that the current imbalances are causing. We have included this recommendation as a first level priority, while recognising it will involve difficult decisions and the unwinding of certain challenging and entrenched patronage systems. ***The McKinsey report (Mourshed et al., 2010)***

There is naturally a strong inter-relationship between these interventions. As a starting point as first identified in Section 6.1 and then repeated in 7.3 there needs to be more research on which a comprehensive plan can be formulated and prioritised, with stakeholders aligned to make "the entire system work for learning" (World Bank 2017a, p. xii). The individual interventions then fit together with 1. 'Teacher Capability' being at the core, supported by 2. 'Mentoring' which in turn is supported by 4. 'DTMT reinvigoration'. Teacher Capability at the core is also supported by 6. 'Learning Resources' and 8. 'Resource Management'. None of this system works without 5. 'Targets, Data and Assessment' the results of which feeds then into 3. 'Teacher Performance' being about recognition and reward and 7. 'Low Performing schools' being about remedial support for the other end of the spectrum. (See Diagram 1 in Section 7.2)

7.6   Intervention Design

It is beyond the scope of this report to include details of designs for the interventions being recommended. In general, interventions should be designed to utilise and build on existing education structures wherever possible. Examples of the structures already in place and of value to the QTLS interventions include the existing syllabus and text books; Technical Thursdays; and a management structure. There are DTMTs, Technical Grade Leaders (TGLs), school principals and in some cases other qualified but currently non-teaching staff to support teachers and mentors. There is also the existing teacher training resource that can potentially be garnered to support teacher quality. Additional standards and tools such as teacher and mentor skills scales, mentoring rotations and mentoring action plans, feedback mechanisms and school-managed student testing, as well as effective record keeping, monitoring and evaluation at every level, are in urgent need of being developed. This is not to suggest that there are any elements of the existing education apparatus that are free from the opportunity to benefit from attention. However with limited capability, immediate transformational change is unrealistic and a pragmatic incremental process is needed when it comes to intervention design. This process has to work within the context of existing capabilities and resources and focus on the most pressing issue first – children are not learning in school.

7.6.1 Cross-cutting Issues

While the protection of children and vulnerable persons (including gender and disabilities), and the non-funding of terrorists are always the key cross-cutting issues for all Western funded organisations, and equally applicable to SeeBeyond-Borders, these interventions are not designed at a level where specific consideration is given to addressing these issues other than to highlight their importance for consideration during detailed intervention design.

7.7 Peripheral considerations

This report addresses what is at the heart of the learning crisis – the quality of teaching and all that supports that endeavour. That is not to say there is nothing more to it. On the contrary there are many factors that feed into making an education system better that need to be addressed. We have only just started.

Diagram 2: "Contradictory interests detract from learning objectives" (World Bank, 2017a p.191)

We have included the World Bank (2017a) diagram here to illustrate the forces that impact learning but recognise the power that they have if they pull towards the same goal of Learning. We have not addressed in any detail the issue of the preparedness of learners, but recognise the vital importance of that initiative especially where poverty is such a pervading issue for the community. Achieving community buy-in is also critical since "building strong partnerships between schools and their communities is also important for sustaining reforms. Where political and bureaucratic incentives for reform are weak, action at the local level can act as a substitute" (World Bank, 2017a, p. 25).

Our focus has been drawn from the McKinsey report's (Mourshed, et al., 2010) phase 1 in an education systems Improvement Journey. We have highlighted the importance of the sequencing initiatives appropriately and moving on from stage 1 and into stage 2 "Getting the foundations in place" (p. 28) will draw related initiatives into clear focus including those that address the transparency of school performance, institutionalised school inspectors, optimising teacher volumes, decentralisation of finance and administration, and a funding allocation model, amongst others. Stage 3 is then "Shaping the Professional" (p. 28) and it is not until here that raising the calibre of entering teachers and principals, or systemic raising of the calibre of existing teachers and principals, is addressed. This may seem a contradiction but the point is that there is a distinction between the basic ability of teachers to deliver lessons, and raising the profile of teachers as a profession which is a vital step, but builds on basic capability as we have recommended in the scheduling of interventions.

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9 APPENDIX 1 Student Achievements by Grade

9.1 Grade 1 Student Achievement by Concept

Our analysis of student test results has allowed us to study, in further detail, which concepts caused particular difficulty for students.

Graph 19: Grade 1 Student Achievement by Concept (1)

Achievement By Concept (AC.1)
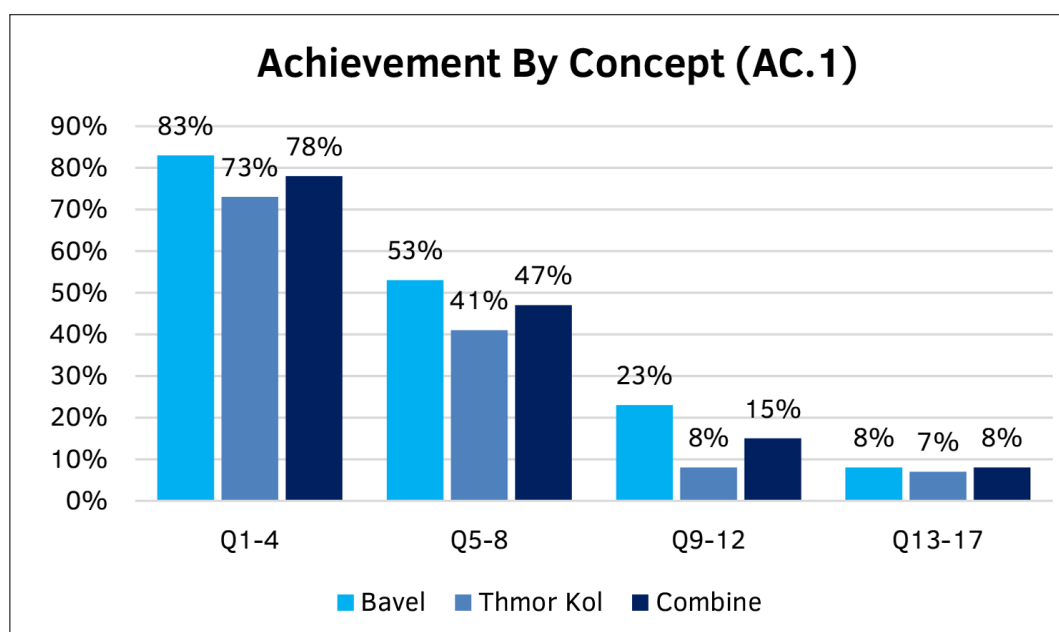
- Q1-4:   Identify missing numeral in a forward counting sequence, counting by ones to 10
- Q5-8:   Identify missing numeral in a forward counting sequence, counting by tens to 100
- Q9-12: Count backwards from a random number less than 20
- Q13-17: Write numbers to indicate the total value of written or spoken words
  e.g.: "Five tens and four ones" (Answer = 54)

Commentary

Challenges

- Counting backwards from a random number less than 20 (15% average student achievement rate)
- Writing numbers to indicate the total value of written or spoken words (8% average student achievement rate)

Concepts with higher rates of student achievement

- Identifying missing numeral in a forward counting sequence, counting by ones to 10 (78% average student achievement rate)
- Identifying missing numeral in a forward counting sequence, counting by tens to 100 (47% average student achievement rate)

Graph 20: Grade 1 Student Achievement by Concept (2)

Achievement By Concept (AC.2)
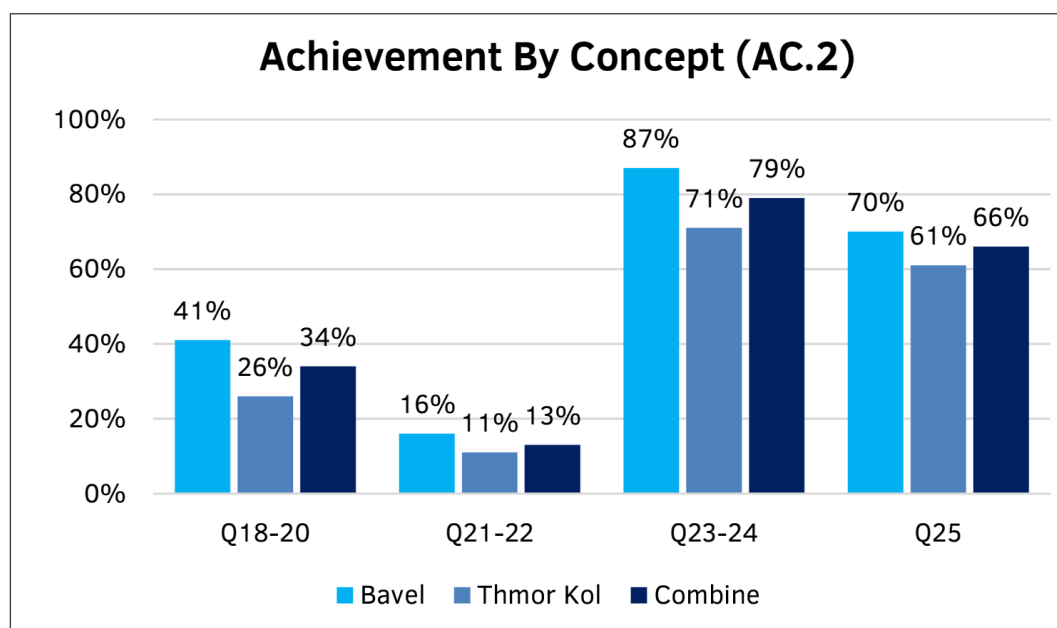
- Q18-20: Write the correct numerals to show the total number of sticks when counting bundles of ten
- Q21-22: Write the correct numerals in a place value chart to show total number of ten sticks and unit blocks
- Q23-24: Fill in missing numbers in a number sentence to match pictures representing addition of a one digit and a one-digit number (1 + 4 = 5)
- Q25:   Identify the total when adding together two groups of objects (pictures)

Commentary

Challenges

- Writing the correct numerals in a place value chart to show total number of ten sticks and unit blocks (13% average student achievement rate)
- Writing the correct numerals to show the total number of sticks when counting bundles of ten (34% average student achievement rate)

Concepts with higher rates of student achievement

- Fill in missing numbers in a number sentence to match pictures representing addition (79% average student achievement rate)
- Identifying the total when adding together two groups of objects (66% average student achievement rate)

Graph 21: Grade 1 Student Achievement by Concept (3)

Achievement By Concept (AC.3)
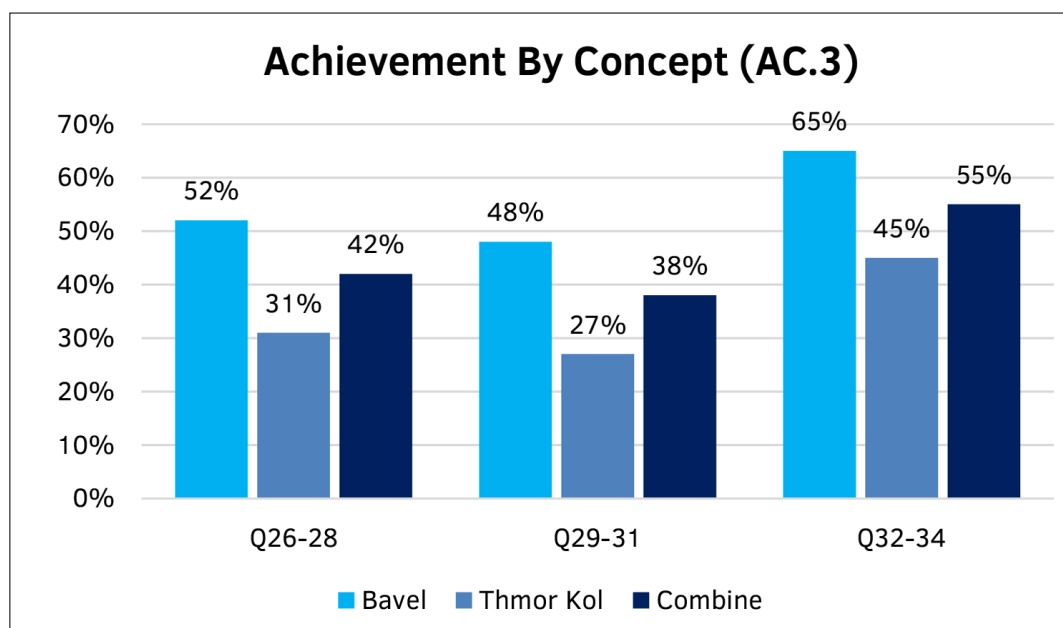
- Q26-28: Fill in missing numbers in a number sentence to match pictures representing subtraction in a horizontal number sentence (5–2 = 3)

- Q29-31: Fill in missing numbers in a vertical algorithm to match pictures representing subtraction

- Q32-34: Fill in missing numbers in a number sentence to match pictures representing addition of two single digit numbers when the result is more than ten

Commentary

Challenges

- Filling in missing numbers in a vertical algorithm to match pictures representing subtraction (38% average student achievement rate)

Concepts with higher rates of student achievement

- Filling in missing numbers in a number sentence to match pictures representing subtraction in a horizontal number sentence (42% average student achievement rate)

- Filling in missing numbers in a number sentence to match pictures representing addition of two single digit numbers when the result is more than ten (55% average student achievement rate)

9.2   Grade 2 Student Test Results

Amongst grade 2 students, only 24% passed the mathematics test (see Graph 11), and the average score across both districts was 30%. This demonstrates a significant lack of understanding by the majority of grade 2 students.

It is important to note the test questions were written in very simple language, in the same style as national curriculum exams, and there were no 'trick' questions or concepts students should not have already been taught.

9.3   Grade 2 Student Achievement by Concept

Graph 22: Grade 2 Student Achievement by Concept (1)
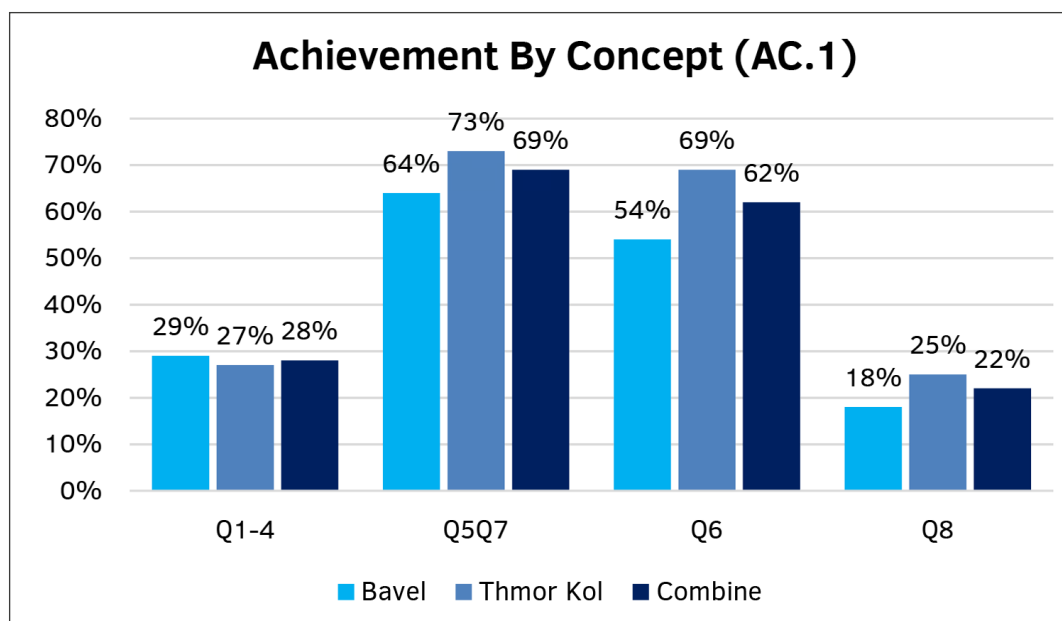
- Q1-4:   Draw tens sticks and unit blocks and write the correct numerals, in a place value chart to show the value of the concrete materials

- Q5,7:   Use an appropriate strategy to add a two-digit number with a one-digit number in a given number sentence, where no trading is required

- Q6:   Use an appropriate strategy to add a two-digit numbers with a two-digit number in a given number sentence, where no trading is required

- Q8:   Write the correct numeral to show the total number of drawn hundred blocks, ten sticks and unit blocks

Commentary

Challenges

- Writing the correct numeral to show the total number of drawn hundred blocks, ten sticks, and unit blocks (22% average student achievement rate)

- Drawing tens sticks and unit blocks and writing the correct numerals, in a place value chart to show the value of the concrete materials (28% average student achievement rate)

Concepts with higher rates of student achievement

- Using an appropriate strategy to add a two-digit number with a one-digit number in a given number sentence, where no trading is required (69% average student achievement rate)

- Using an appropriate strategy to add a two-digit number with a two-digit number in a given number sentence, where no trading is required (62% average student achievement rate)

Graph 23: Grade 2 Student Achievement by Concept (2)
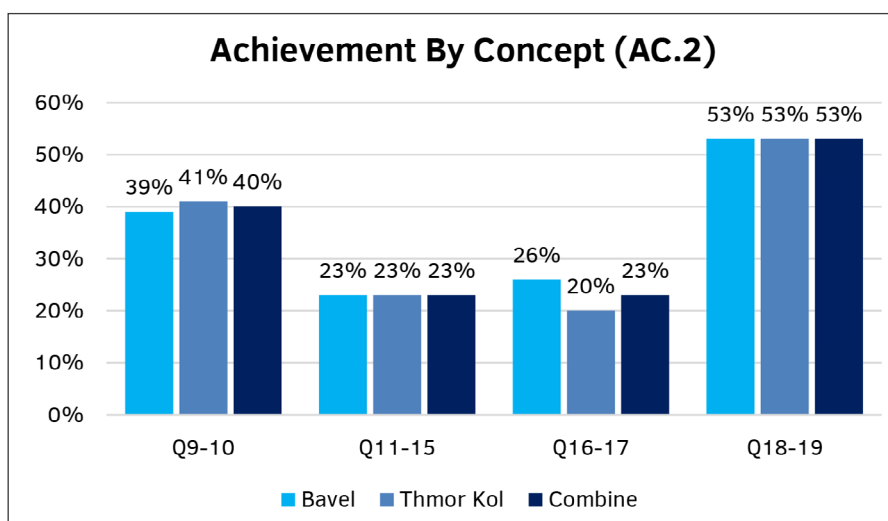
- Q9-10:   Order two-digit numbers from smallest to largest
- Q11-15: Order three-digit numbers from smallest to largest
- Q16-17: Count backwards by tens, off the decade, from a given two digit number (93)
- Q18-19: Use correct procedure to add a three-digit number with a three-digit number in a vertical algorithm where trading is not required

Commentary

Challenges

- Ordering three-digit numbers from smallest to largest (23% average student achievement rate)
- Counting backwards by tens, off the decade, from a given two digit number (23% average student achievement rate)

Concepts with higher rates of student achievement

- Ordering two-digit numbers from smallest to largest (40% average student achievement rate)
- Using the correct procedure to add a three-digit number with a three-digit number in a vertical algorithm where trading is not required (53% average student achievement rate)

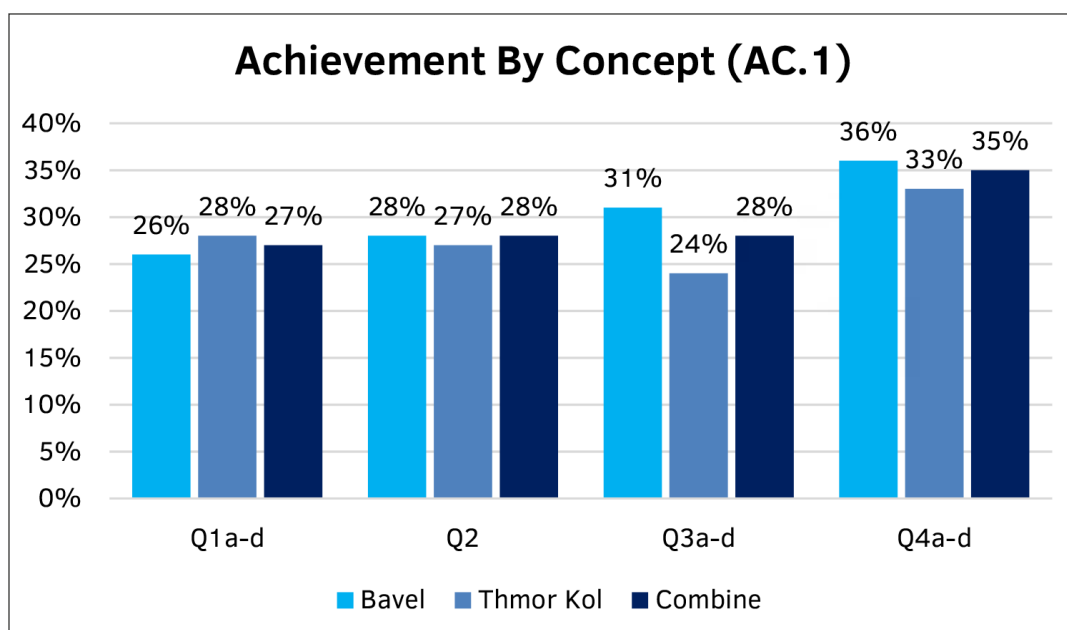*Graph 24: Grade 2 Student Achievement by Concept (3)*
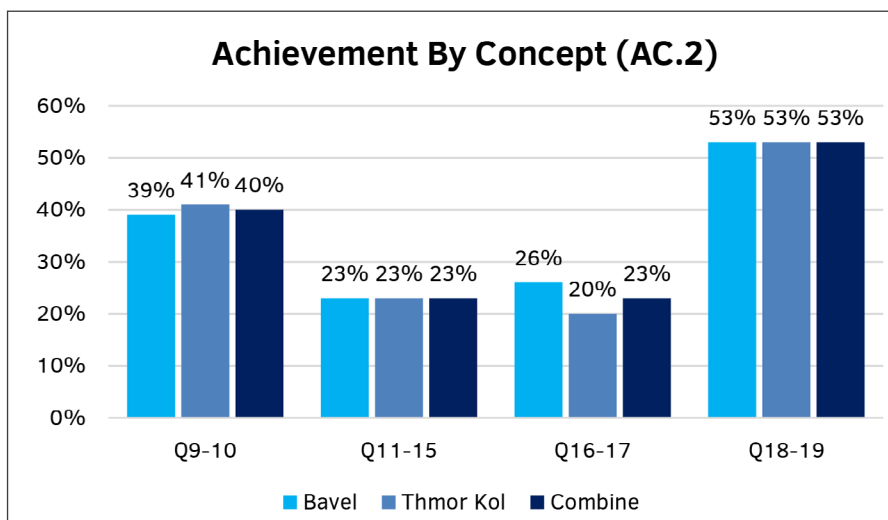
- Q20-21: Use the correct procedure to add a three-digit number with a two or three-digit number, in a vertical algorithm where trading is required

- Q22-23: Calculate a subtraction between a three-digit and two-digit number, using a number line

- Q24:   Use mental arithmetic strategy to solve a simple word problem

- Q25:   Use drawings to represent the word problem

Commentary

Challenges

- Using drawings to represent a word problem (6% average student achievement rate)

- Calculating a subtraction between a three-digit and two-digit number, using a number line (7% average student achievement rate)

- Using the correct procedure to add a three-digit number with a two or three-digit number, in a vertical algorithm where trading is required (19% average student achievement rate)

- Using mental arithmetic strategy to solve a simple word problem (37% average student achievement rate)

Graph 25: Grade 2 Student Achievement by Concept (4)

- Q26:   Write the number sentence to represent the word problem

- Q27:   Use the correct procedure to subtract a three-digit number from a three-digit number in a vertical algorithm, where trading is not required

- Q28:   Use the correct procedure to subtract a three-digit number from three-digit number in a vertical algorithm, where trading is required

- Q29-30: Use the correct procedure to multiply a two-digit number by a one-digit number in a vertical algorithm, where trading is not required

Commentary

Challenges

- Writing a number sentence to represent a word problem (9% average student achievement rate)
- Using the correct procedure to subtract a three-digit number from three-digit number in a vertical algorithm, where trading is required (11% average student achievement rate)
- Using the correct procedure to multiply a two-digit number by a one-digit number in a vertical algorithm, where trading is not required (24% average student achievement rate)

## Concepts with higher rates of student achievement

- Using the correct procedure to subtract a three-digit number from a three-digit number in a vertical algorithm, where trading is not required (44% average student achievement rate)

9.4 Grade 3 Student Test Results

The testing of grade 3 students revealed very concerning results with only 7% of students successfully passing the test (8% in Bavel district and 7% in Thmor Kol). The average score across both districts was 29%, demonstrating most students fell far below the required pass mark of 50%. This very low pass rate indicates that the majority of students will not pass their end of year tests and will be required to repeat grade 3. This is de-motivating and is often a cause of school dropouts.

9.5 Grade 3 Student Achievement by Concept

*Graph 26: Grade 3 Student Achievement by Concept (1)*
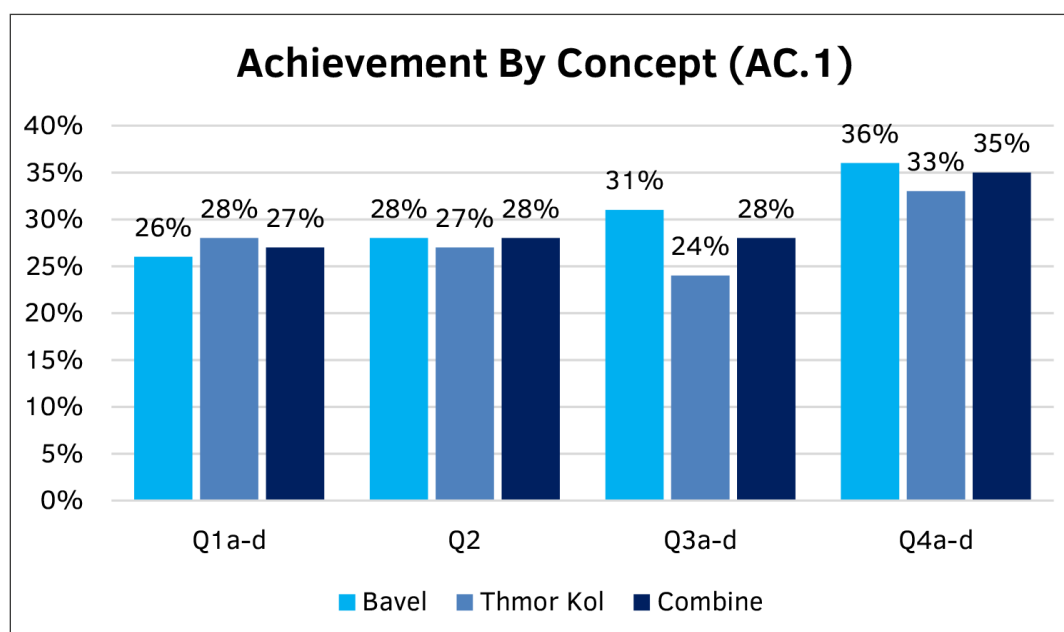
- Q1a-d: Write words to describe three or four digit numbers e.g.: 356 = Three hundred and fifty six
- Q2:   Order 3 and 4 digit numbers from smallest to largest
- Q3a-d: Use the correct symbol to compare two numbers (< or >)
- Q4a-d: Use words to correctly describe the relationship between two numbers

Commentary

Challenges

- Describing, comparing and ordering three- and four-digit number. The average percentage of students able to correctly answer the questions in this section was below 36%.

Graph 27: Grade 3 Student Achievement by Concept (2)
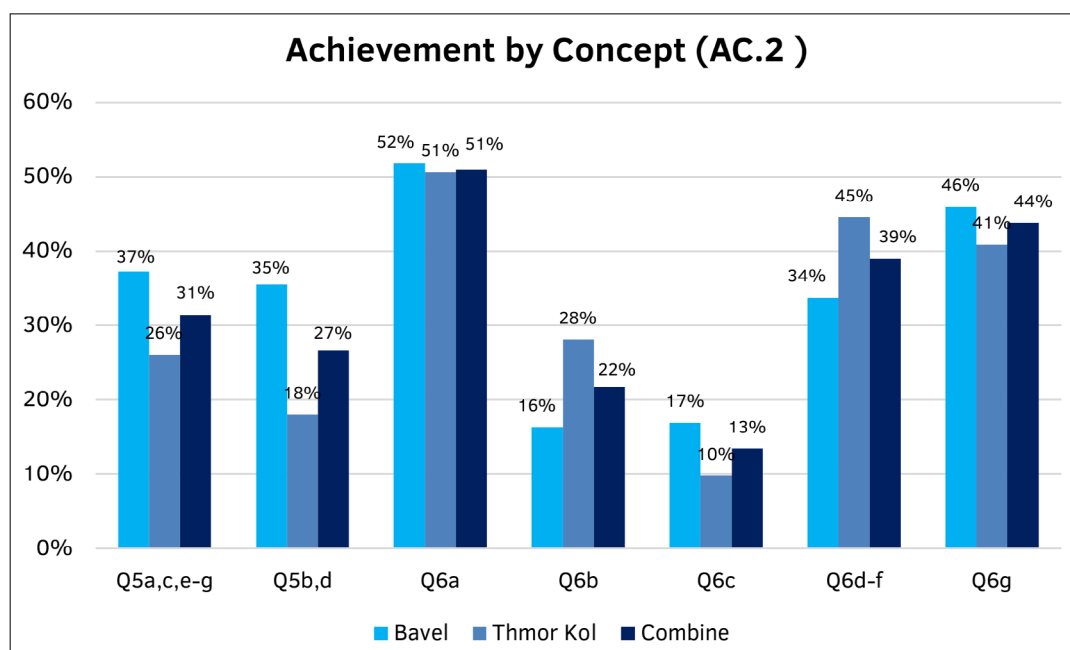
- Q5a, c, e-g: State the value of a numeral in a three digit number according to its place value

- Q5b, d: State the value of a numeral in a four or five digit number according to its place value

- Q6a: Use an appropriate strategy to add two three-digit numbers, in a given number sentence, where trading is not required

- Q6b: Use an appropriate strategy to add two three-digit numbers, in a given number sentence, where trading is required

- Q6c: Use an appropriate strategy to subtract between two three-digit numbers, in a given number sentence, where trading is required

- Q6 d-f: Use the correct procedure to add two three/four/five-digit numbers in a vertical algorithm, where trading is required

- Q6g: Use the correct procedure for subtracting between three-digit numbers in a vertical algorithm, where trading is not required

Commentary:

Challenges:

- Of particular interest are the results which relate to solving addition and subtraction problems. These problems were presented in two ways: as number sentences,

  e.g.: 328 + 126 = ?   or as a vertical algorithms e.g.:   3 2 8
            + 1 2 6
              ?

- Whilst still a cause for concern, 39% of students were able to solve a vertical algorithm, for addition, where trading was required, using three-, four- or five-digit numbers. In comparison, only 27% of students were able to use an appropriate strategy to solve a similar problem, when it was presented as a horizontal number sentence and using only three digit numbers. This demonstrates that although some students could demonstrate procedural fluency to solve the vertical algorithm, 73% of students, when faced with the horizontal number sentence, failed to either a) employ mental strategies to solve the problem or b) recognize that they could rewrite the number sentence as a more familiar vertical algorithm in order to solve it. This is an example of a dependence on rote learned procedural fluency and an inability to generalize, when a problem is presented in an unfamiliar format.

- Stating the value of a numeral in a four or five digit number according to its place value (Less than 27 % student achievement rate)

Higher Student Achievement rate

- Using an appropriate strategy to add two three-digit numbers, in a given number sentence, where trading is not required (51% student achievement rate)

- Using the correct procedure for subtracting between three-digit numbers in a vertical algorithm, where trading is not required (44% student achievement rate)
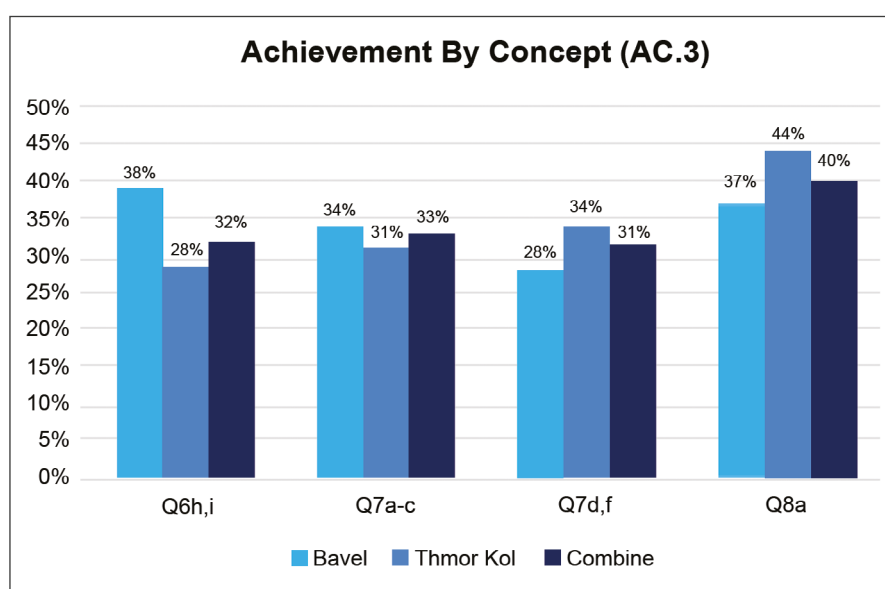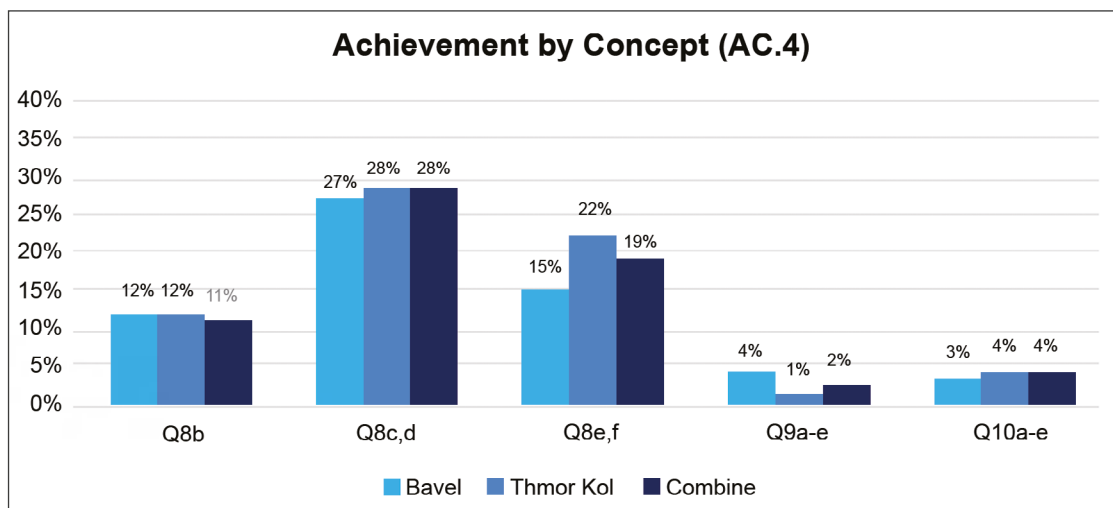

Graph 28: Grade 3 Student Achievement by Concept (3)

- Q6h,i: Use the correct procedure to complete a vertical algorithm for subtraction between two four-digit numbers, where trading is required

- Q7a-c: Use appropriate strategies for division of a two-digit number by a single digit number in a given number sentence

- Q7d-f: Use the correct procedure to complete a formal algorithm for division of a three-digit number by a single digit number

- Q8a: Use an appropriate strategy for multiplication of a two-digit number by a single digit number, in a given number sentence, where trading is not required

Commentary

Challenges:

- Solving problems involving division of a two- or three-digit number by a single digit number, whether displayed as a horizontal number sentence or a formal algorithm (Less than 33% student achievement rate)

Achievement by Concept (AC.4)

Higher Student Achievement rate

- Using appropriate strategy for multiplication of a two-digit number by a single digit number, in a given number sentence, where trading is not required (40% student achievement rate)

Graph 29: Grade 3 Student Achievement by Concept (4)

- Q8b: Use an appropriate strategy for multiplication of a two-digit number by a single digit number, in a given number sentence, where trading is required

- Q8c,d: Use the correct procedure for multiplication of a two-digit or three-digit number by a single digit number, in a vertical algorithm, where trading is not required

- Q8e,f: Use the correct procedure for multiplication of a three-digit number by a single digit number, in a vertical algorithm, where trading is required

- Q9a-e: Identify fractions of an area

- Q10a-e: Finding a fraction of a collection. E.g.: "What is one third of nine?" or "What is half of 30?"

Commentary

Challenges:

- Using an appropriate strategy for multiplication of a two-digit number by a single digit number, in a given number sentence, where trading is required (11% student achievement rate)

- Identifying fractions of an area (2% student achievement rate)

- Finding a fraction of a collection. E.g.: "What is one third of nine?" or "What is half of 30?" (4% student achievement rate)

- Using the correct procedure for multiplication of a two-digit or three-digit number by a single digit number, in a vertical algorithm, where trading is not required (28% student achievement rate)

- Using the correct procedure for multiplication of a three-digit number by a single digit number, in a vertical algorithm, where trading is required (19% student achievement rate).

10   APPENDIX 2 SeeBeyondBorders Credentials

SeeBeyondBorders activities are based on three pillars:

1. Robust Governance - Accreditations

2. Innovative programs – Awards

3. Effective projects - Impact

SeeBeyondBorders is committed to openness, transparency and good governance in all its operations. In the latest Transparency Report (2016), we published details of our key achievements during the year, as well as the challenges we faced and the lessons learned. It provides a transparent insight into our organisational planning and demonstrates our commitment to continual improvement. We also publish full financial details for the organisation on our website, and detailed reports every six months for each of the districts in which we work.

10.1 Governance

In July 2017, SeeBeyondBorders achieved accreditation from the Department of Foreign Affairs (DFAT), and is now supported by the Australian Government through the Australian NGO Cooperation Program (ANCP). The ANCP is an Australian Government initiative that supports the development activities of accredited Australian Non-Government Organisations (NGOs), and only accredited NGOs are eligible to receive ANCP funding. ANCP accreditation recognises the soundness of SeeBeyondBorders' governance; financial management; policies, including child protection; program development; monitoring; and evaluation processes.

SeeBeyondBorders is also a New South Wales Education Standards Authority accredited provider of professional development for maintenance at Proficient Teacher level in Australia.

SeeBeyondBorders is a member of the Australian Council for International Development (ACFID), the national peak body of international development non-government organisations, and is a signatory to its Code of Conduct. SeeBeyondBorders is committed to adhering to the Code.
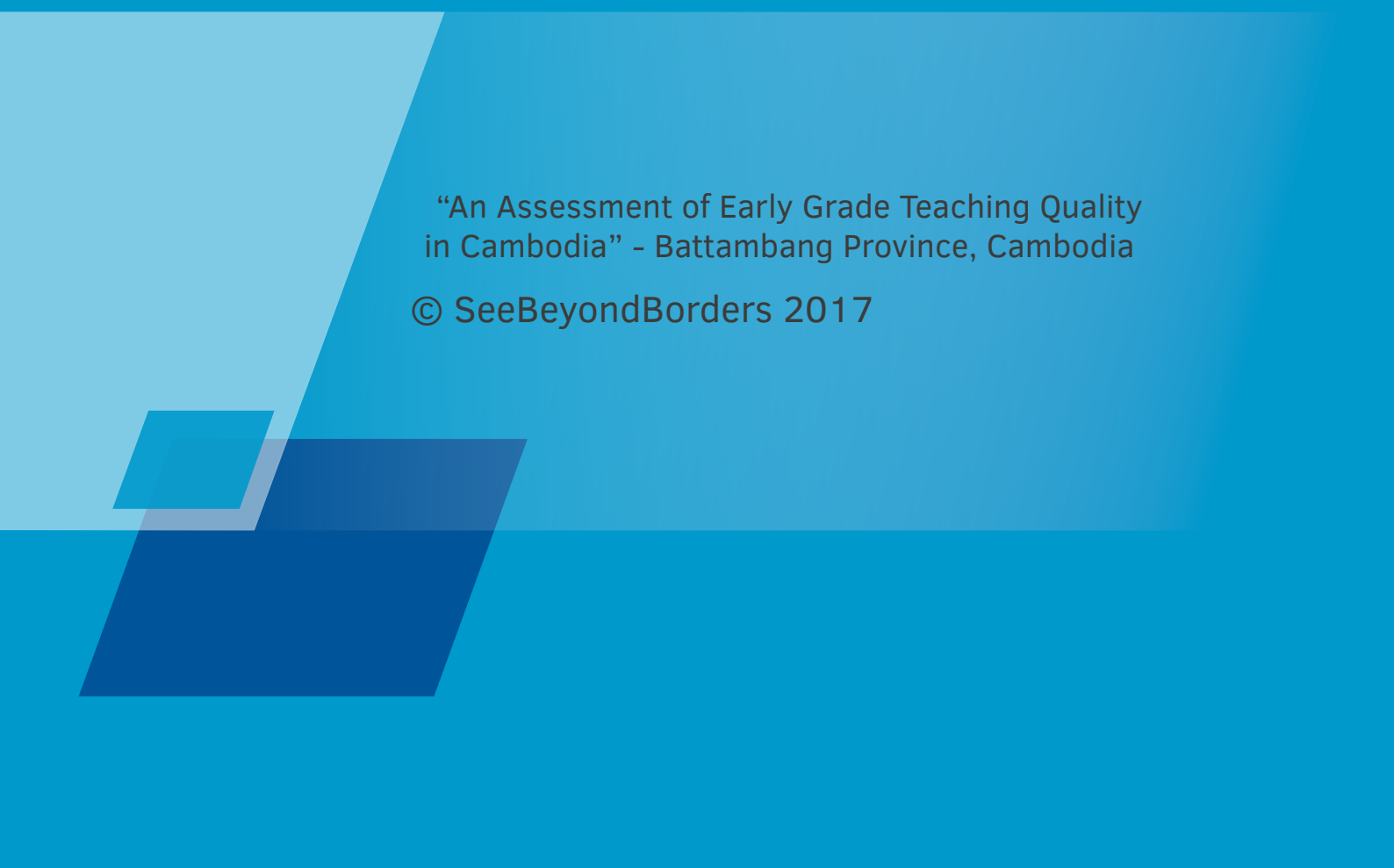
A member of the NGO Education Partnership (NEP) in Cambodia, promoting cooperation and collaboration between NGOs operating in the country and government departments, SeeBeyondBorders actively participates in NEP Education Support Teams in Battambang (BEST) and Siem Reap (SEST).

10.2 Program awards

The work of SeeBeyondBorders was recognised in 2016 by UNESCO, when we received the 2015-2016 UNESCO-Hamdan prize for Outstanding Practice and Performance for Enhancing the Effectiveness of Teachers. A representative from the UNESCO-Hamdan prize judging panel has explained: "SeeBeyondBorders Cambodia was selected for its thoughtful and rigorous approach...and the attention that it paid to mentoring and school-based support, not only for teachers, but for facilitators – there are no shortcuts to developing quality teachers."

In October 2017, SeeBeyondBorders received an Honourable Commendation for its teacher training program in the UNESCO Wenhui Awards. The theme of the 2017 Wenhui Award, Innovations in the Professional Development of Teachers, aimed to draw attention to the importance of the professional development of teachers.

In August 2016, the Minister of Education, Youth and Sport, Mr Hang Chuon Naron, visited SeeBeyondBorders' project in Angkor Thom district. The Minister recognised the value and effectiveness of SeeBeyondBorders' quality teaching model, and in a letter endorsing SeeBeyondBorders' programs, he committed his full support to replicating our mentoring model in as many districts as possible in Cambodia. He also said, "The Ministry of Education, Youth and Sport highly commend the work of SeeBeyondBorders and hope that Ministry and SeeBeyondBorders education team can continue to work closely together to further develop the capacity of teachers and mentors in Cambodia, and significantly improve student