- Interpret images (e.g. "What belongs in this kitchen?")
- Explain why an answer is correct or incorrect

The table below summarizes the classroom observation study's findings on teacher questioning.

Table 24. Teacher Questioning Techniques Observed During Lessons

Questioning techniques used by *the teacher* during the lesson	Treatment (N=18)	Control (N=14)
Asks individual learners to answer questions or do a task on their own	18	14
Gives many different learners opportunities to answer questions on their own	18	13
Prompts learners to repeat words, answers, definitions, or sounds all together	14	10
Asks learners *open* questions that allow for more than one possible answer	9	6
Asks learners *closed* questions that elicit yes/no, single word, or short restricted responses	18	14

Observations of Student Learning

A pupil-centered approach to assessment includes teachers' informal observations of learning. This study assessed whether teachers moved around the room during lessons, looking at what groups or individual learners were doing. Findings showed that about three-quarters of treatment teachers (72 percent) took the time to observe children working on either small group or individual learning tasks. In control classrooms, 43 percent of teachers observed children working. This study also looked for instances of support, where the teacher assisted groups or individual learners on independent tasks. Similarly, three-quarters of treatment teachers provided individualized support, whereas half of control teachers did so.

Teacher Feedback on Learning

The nature of teacher feedback on student learning is the final component of assessment considered in this study. Based on analyses of lesson narrative data, findings showed that all teachers in treatment and control classrooms gave feedback to some extent that indicated whether a response was right or wrong, but did not indicate why or what criteria was missing to answer correctly. Most often teachers indicated whether responses were *correct*, using the "Clap for him/her" strategy, a prevalent technique used by nearly all teachers. Generally, when a learner answered a question incorrectly, the teacher moved on to ask another learner or asked a different question, rather than supporting the student to reach the answer.

Findings did show, however, that three Step-down trained teachers and three control teachers stopped to focus on learners' mistakes and made time and effort to address errors by explaining why the answer was/was not correct. For example, during a treatment P3 literacy lesson on pronouns, the teacher wrote on the board: "The book is [our, our's, ours]." The teacher called on a learner to read the sentence aloud and underline the correct pronoun. After the learner underlined, "our's," the teacher explained: "No, when you are using a possessive pronoun, you don't use the apostrophe." In this example, the teacher made an effort to provide some criteria (albeit limited) for why the answer was incorrect.

Summary of Assessment

Across the 32 lessons, teachers demonstrated mostly similar assessment techniques. All teachers in this sample asked individual learners questions, especially closed-ended questions, and gave feedback that indicated whether a response was right or wrong. Three-quarters of teachers adopted a traditional call and chorused response approach in which children were prompted to repeat words, phrases, and sounds in union after the teacher. This finding reflects a traditional teacher-centered discourse pattern, which emerged in Phase 2 research during the training and small-scale classroom study. Very few teachers gave feedback that addressed why student responses were correct or incorrect. Some variation was observed in the extent to which treatment teachers moved around the room to observe and support children during independent tasks.

Use of Teaching and Learning Materials

Where Section 4.2 of this report examined the display of materials in classrooms, this sub-section assesses the kinds of teaching and learning materials *handled* or *used* during lessons and by whom. The table below summarizes these findings, comparing treatment with control lessons, and distinguishes between materials used by the teacher and by the learner(s). The materials observed were identified from the TFET training manuals as creative, low or no-cost resources. In no lessons did learners go outside to gather materials or have community members visit to share their expertise.

Table 25. Teaching and Learning Materials Used During Lessons

Teaching and learning materials handled during the lesson	By *the learners*		By *the teacher*	
	Treatment (N=18)	Control (N=14)	Treatment (N=18)	Control (N=14)
Letter flash cards	0	0	0	0
Number flash cards	1	0	0	0
Other cards (e.g. nouns, verbs, etc.)	3	0	3	0
Play dough	0	0	0	0
Paint	0	0	0	0
Counters	3	4	3	4
LEGOs	1	1	1	1
Board/chalk	12	8	18	14
Other	5	0	3	2

Across the 32 lessons, all teachers used the chalkboard for teaching and learning. In two-thirds of treatment lessons, learners also used the chalkboard to demonstrate learning, with relatively fewer opportunities in control lessons (57 percent). We did not observe use of letter flash cards, play dough, or paint.

Teachers and students in one treatment and one control lesson used LEGOs, despite all treatment schools receiving a box of LEGOs from Sesame. Focus group data from the 2018 Midline I report revealed most teachers did not understand how to purposefully design hands-on LEGO activities around a learning

objective, such as developing fine motor skills, cooperative play, and problem solving. Teachers mainly used LEGOs to keep children occupied, as rewards for completing tasks, and for teaching colors, number concept, and shapes.

What distinguishes lessons is the use of cards during a few treatment lessons. Examples are word cards that children arranged into a sentence on the board and sentence strips that learners read aloud and reformed into positive or negative statements. Other materials used during lessons included a "number wheel" made of cardboard for learners to practice subtraction and a stick used by the teacher to draw mathematics symbols on the ground. Learners were then told to jump onto the correct symbol (e.g. [+] for "addition"). This lesson, as an attempt to incorporate games and play, is discussed in further detail below. In sum, the chalkboard was the most frequently used resource across all lessons, with a few teachers incorporating other kinds of creative materials.

Although treatment teachers displayed about five times more teaching materials than control teachers, relatively few materials were actually used for teaching and learning (other than the chalkboard). The Training report and Midline I study both showed that teachers found Module 4 on developing materials useful, and that trainers spent the most amount of time covering this content. The clarity of trainer explanations was, however, mostly unclear, with little to no explanation of *how* low-cost materials promote learners' conceptual growth in literacy and numeracy. Findings from this study substantiate findings from earlier work and suggest teachers may be prepared to recruit materials from their environment and put these on display, but are left relatively unprepared to effectively use these for instruction.

Learning through Play

Play in the early primary grades can bring literacy and numeracy concepts to life within the "social realm" of child interaction (Souto-Manning and Martell, 2016, pp. 57). The TFET program presents play as a teacher guided activity and gives examples such as Oware, Hopscotch, Ludo, and role-play. This study looked for instances of play or games initiated and facilitated by the teacher during lessons. Across the 32 lessons, only three teachers incorporated play. This included the use of LEGOs during one treatment and one control lesson. During the control lesson, LEGOs were used as counters to teach addition. In the treatment lesson, LEGOs were used to teach colors; learners then grouped and counted each set of LEGOs according to color.

Play was also observed during a Master-trained teacher's KG2 numeracy lesson. After the teacher taught a whole group lesson on subtraction, in which several learning styles were addressed (learners using their arm to represent the minus sign; using numeracy flash cards for naming symbols; counting bottle tops to practice operations; and drawing symbols in the air with their fingers), the teacher took the children outside to play a numeracy game. The teacher drew several numeracy symbols on the ground with a stick, and after calling out each symbol name, children jumped onto the correct symbol (e.g. minus sign). The class clapped for correct answers, and if learners answered incorrectly, they were dismissed from the game. The teacher spent most of the time teaching children to recognize operation *symbols*, rather than representing and/or solving addition and subtraction problems. While creative, and tied to a learning

objective (recognizing symbols), the game was also rule-based and competitive, rather than designed for children's natural exploration of numeracy.

Conclusions on Classroom Pedagogy

Overall, the 32 classroom observations showed a pedagogic structure that was more similar than different across treatment and control schools. (see Appendix G). Most teachers spent the 45-minute observation period teaching one numeracy or literacy lesson. Literacy lessons focused mainly on grammar and speaking, while numeracy lessons focused on operations, number concept, and counting. Very few extended texts were observed, and most text was created on the board by the teacher. Although Master-trained teachers used twice the number of pupil-centered literacy techniques and activities as Step-down trained, uptake will likely remain challenged by the lack of extended texts and storybooks in classrooms and lack of clarity of training and materials. Many of the literacy techniques outlined by the TFET program support reading of extended text. Very little reading and writing instruction were observed in any classroom, though children had more opportunities to write in treatment classes.

Learning styles were largely similar across lessons, in which learners mainly saw and spoke about the lesson topic. The lack of extended texts and teachers' emphasis on speaking and grammar may partly explain this finding. Oral communication and chorusing, traditional teacher-centered discourse patterns, are also prevalent across classrooms. During numeracy lessons, about two-thirds of all teachers used hands-on materials, especially counters, reflecting a concrete orientation to numeracy. Assessment techniques were similar across lessons, with teachers asking mostly closed-ended questions and giving more restricted forms of feedback on learner responses. However, treatment teachers did show relatively more movement around the room to observe and support student learning. Few differences were observed in the use of materials, except for literacy cards in treatment lessons, and very little teacher-guided play was found.

What stands out pedagogically in treatment classes is the use of student grouping during numeracy lessons and, though minimal, grouping (differentiating) students by ability. The prevalence of student grouping in this section substantiates findings in Section 4 of this report and those from the 2018 Master Training Report, which found an emphasis by trainers on classroom management, the spatial arrangement of learners in the classroom, and recruitment of materials from the local environment. Although pedagogy across lessons was more similar than different, there is some emerging uptake in TFET pedagogic techniques, though at a mostly surface level – i.e. spatial and material changes in pedagogy.

Conclusions

Findings from the Midline II classroom observation study are largely consistent with earlier Phase 2 findings from the 2018 Training Report, materials review, and Midline I research. We found that the classroom learning environments of treatment teachers were relatively more pupil-centered, especially in the display of learning materials, variety of learners' seating/grouping arrangements, and positive styles of classroom management. Earlier Phase 2 research provides two kinds of explanations for the uptake.

First is ***clarity*** in the presentation of TFET content. Findings across several reports suggest the extent to which concepts are clearly defined in materials (manuals, videos, and workbooks) will likely reflect in the quality of Master and Step-down training, and potentially coaching. As a result, when particular concepts are relayed clearly from one context to another (e.g. from materials to training), it is more likely teachers will be prepared to apply these in their instruction. Differences in training quality may also explain why some variation emerged in this study between Master and Step-down teachers, especially in the use of literacy techniques.

Second is the ***complexity*** of the techniques being transmitted. Putting materials on display, reorganizing learners into groups, and adopting classroom management techniques do not necessarily require a substantial shift in teachers' pedagogical knowledge or changes to dominant teacher-learner discourse patterns. In this regard, narrative data from this work revealed more similarities than differences across the 32 observed lessons, which tend to follow a predictable, teacher-centered lesson structure. Teacher-learner discourse reflects a traditional call and response ("chalk and talk") style, with very few texts (other than the chalkboard) used during lessons. Teachers tend to ask closed-ended questions and provide very little feedback to children on their responses. Changing or shifting teachers' pedagogical knowledge, especially teachers who are formally untrained, requires on-going, in-depth engagement with the principles of how children learn. The link between techniques, how they promote learning, and what makes them effective was not consistently observed across cascade training contexts.

In conclusion, due to the clarity, emphasis, and accessibility of particular program content (especially Modules 2, 3, and 4), treatment teachers were seen to display some of the organizational and regulatory elements of pupil-centered teaching. The final section of this report offers several recommendations for strengthening the clarity and transmission of program content in a way that may shift established patterns of classroom discourse and pedagogic practice.

Recommendations

- **Focus the TFET program on fewer techniques that target teachers' pedagogical needs.** Phase 2 research indicates teachers' primary needs are pedagogical content knowledge in literacy and numeracy (how to formulate knowledge to make it comprehensible for students); how to use teaching and learning materials to aid learners' conceptual development; and teaching in multi-grade classrooms.

- **Reconsider alignment between program techniques (e.g. reading of extended texts in Module 5) and the reality of classroom contexts (i.e. lack of extended texts).** Although it is not part of the program, the most frequently cited resource need by teachers is more texts (e.g. storybooks, activity books, textbooks, nonfiction books, etc.)

- **Extend overall training time to cover modules in sufficient clarity and depth.** A recurring finding, especially from training observations and teacher focus groups, is that the program covers too much material too quickly and in insufficient depth.

- **Revise program materials so the main concepts and content are presented clearly for trainers and teachers to reference.** This means concepts (e.g. "differentiation") should be clearly defined, presented in extensive detail, and exemplified in more than one way; links are carefully drawn between the concept and real-life examples that reflect the teaching principle in practice and how it promotes learning. Revisions to the clarity of program material will support greater consistency in content transmission across training contexts, help avoid training misconceptions, and deepen teachers' understanding of techniques.

- **Provide program participants with a Step-down training guide to support training consistency** (e.g. over how many days, for how long, with which participants, how often, etc.). Step-down trainers also need criteria for evaluating the quality of trainee participation and pedagogy, such as analytic rubrics for measuring the pupil-centeredness of instructional activities. School leaders, such as principals and head teachers, could also use these rubrics to support regular school-based teacher observations. Lastly, strategies to support the circulation of techniques within a context of relatively high teacher turnover may be helpful (e.g. implementing teacher learning communities that share and reflect on techniques).

- **Provide teachers with a written set of observation notes following on-site coaching visits** (e.g. description of what was observed, teacher strengths, and areas for improvement). A written record that includes explicit feedback supports teacher reflection on instructional effectiveness and growth over time. Written records of coaching visits may also be collated by Sesame to further develop the training program and monitor changes in teachers' practice. Modeling by coaches of other desired teacher behaviors, e.g. forms of pupil-centered discourse, open-ended questions, feedback on responses, may also support desired changes in traditional pedagogy. Consistency in coaching approaches should also be maintained.

References

Creswell, J.W. & Creswell J.D. (2018) Research design: Qualitative, quantitative, and mixed methods approaches. London: SAGE.

Souto-Manning, M. & and Martell, J. (2016) Reading, writing, and talk: Inclusive teaching strategies for diverse learners, K-2. New York: Teachers College Press.

Westbrook, J., Durrani, N., Brown, R., Orr, D., Pryor, J., & Boddy, J. (2013). Pedagogy, curriculum, teaching practices and teacher education in developing countries, EPPI education rigorous literature review. London: Institute of Education. World Bank. (1999). Education sector strategy. Washington, DC: World Bank.

Wolf, S., Aber, J., Behrman, J., & Tsinigo, E. (2019) Experimental impacts of the "Quality Preschool for Ghana" interventions on teacher professional well-being, classroom quality, and children's school readiness. Journal of Research on Educational Effectiveness, 12:1, 10-37.