

## BRIEFER

# ULA and Mathematics Teaching and Learning Materials Uptake Study

Uzbekistan Education for Excellence Program

September 2023

## INTRODUCTION AND BACKGROUND

The Uzbekistan Education for Excellence Program (the Program), funded by the United States Agency for International Development, designed the Uzbek Language Arts (ULA) and Mathematics Teaching and Learning Material (TLM) Uptake Study to learn whether and how teachers and students in grades 2 and 4 are using the new teacher guides (TGs) and student textbooks (STBs). The Program used Phase 1 results and ensuing recommendations to inform the development and finalization of materials and ongoing teacher professional development (TPD) efforts. Phase 2 results served to determine whether teachers became more proficient over time in their application of the Student-Centered Strategies (SCSs) embedded in the TGs and STBs.

The TLM Uptake study was designed to answer the following research questions:

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*RQ1. To what extent do the content, instruction, and design of the ULA and Mathematics TGs and STBs support the delivery of lessons and adhere to best practices?*

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*RQ2. How are teachers modifying ULA and Mathematics lessons as they teach with the new TLMs in the classroom?*

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*RQ3. To what degree are ULA and Mathematics teachers applying selected SCSs in the classroom?*

## METHODOLOGY

RTI's essential guidance and best practices for developing TGs served as the guiding conceptual framework for this ULA and Mathematics TLM Uptake Study.<sup>1</sup> This study applied the framework in several ways: to assess the quality of the TLMs; to determine teachers' modifications to lessons and activities when using TLMs in the classroom, to inform the final versions of TLMs; and to track progressive changes over time in teachers' observable behaviors based on four stages of change: Not yet started, Novice, Emerging, and Proficient. Phase 1 was conducted in November 2022 and focused on data collection that informed eventual TLM finalization and on ongoing TPD. The Program also conducted teacher classroom observations to determine the extent to which teachers were applying SCSs from the TGs. In Phase 2, conducted in May 2023, the Program focused only on detecting progressive changes made by teachers in the application of SCSs and the correlation of those changes with teachers' self-efficacy.

## KEY FINDINGS

The findings of the TLM Uptake Study Phases 1 and 2 are presented below and are organized by research question (RQ).

***RQ1. To what extent do the content, instruction, and design of the ULA and Mathematics TGs and STBs support the delivery of lessons and adhere to best practices?***

<sup>1</sup> Piper, B., Sitabkhan, Y., Mejia, J., and Betts, K. (2018). *Effectiveness of Teachers' Guides in the Global South: Scripting, Learning Outcomes, and Classroom Utilization*. RTI Press Publication No. OP-0053-1805. Research Triangle Park, NC: RTI Press. <https://doi.org/10.3768/rtipress.2018.op.0053.1805>

The ULA and Mathematics TGs and STBs meet the rigorous, evidence-based evaluation criteria for content, instruction, design, and adherence to student standards. The findings are summarized below.

- **Page layout:** The ULA and Mathematics TGs and STBs page layout is consistent throughout.
- **Formatting:** All reviewed ULA and Mathematics TG lessons follow the preferred formatting guidance throughout. For example, TLMs have colorful bolded headings throughout.
- **Standards and lesson objectives:** TG lesson design includes a ULA theme or a Mathematics unit title. These are clearly labeled at the beginning of a lesson along with the individual learning standard addressed in the lesson. These set the overall objectives of the activities for each lesson.
- **Clarity and cohesion:** The Program found consistent application and effective use of icons, placement of headings, subheadings, textboxes, and images as well as alignment of TGs with STBs.
- **Instructional supports:** TG design considered teacher instructional support by using heavier scripting at the beginning of the TG, which is subsequently reduced as the year progresses and teachers become familiar with the lesson structure and accompanying methodology.
- **Structure, front matter content, functionality:** The Program found that the Mathematics and ULA TGs follow consistent practices regarding the structure, front matter content, and functionality of TGs.
- **Scaffolding of skills:** The desk review revealed that STB content progresses from simple to more difficult learning tasks, and skills are presented in a spiral format in that they are presented throughout the year.
- **Language/Text:** The Program found the STBs to be age-appropriate, and they effectively communicate appropriate messages. However, gender equity and inclusion of people with disabilities and persons from different regions, socioeconomic, and cultural/ethnic backgrounds are lacking in most Mathematics and ULA lessons.
- **Illustrations and graphics:** The desk review found the use of graphics and illustration to be effective. For example, illustrations and graphics accurately reflect and support the lesson content.
- **Social-emotional learning skills:** These are addressed in most lessons, specifically teamwork, relationships, responsible decision-making, and self-awareness.
- **Critical thinking:** The use of critical thinking to evaluate evidence to solve problems or complete activities independently and with others, and to interpret graphics, problems, and questions, is present in most activities of the TLMs.
- **Creativity:** Lessons provided students with opportunities to explore and use their own creativity in relevant, interesting, and worthwhile ways throughout the reviewed TLMs.
- **Problem solving:** The desk review found problem solving to be present in all reviewed lessons. For example, ULA lessons included graphic organizers, Venn diagrams, word study, and comprehension questions to encourage and support problem solving.
- **Individual, group, pair work:** Both Mathematics and ULA TGs include group and pair work, but only in a few lessons.

In the areas of language, objectives, and clarity and cohesion, the desk review identified some areas of improvement and needed adaptations. The Program subsequently addressed these and other recommendations during the development and revision of the TLMs, as described in detail the Desk Review Report.<sup>2</sup>

## **RQ2. How are teachers modifying ULA and Mathematics lessons as they teach with the new TLMs in the classroom?**

As teachers began to use the TLMs in Phase I, they modified Mathematics lessons mostly because they struggled to become familiar with the new methodology of giving students time to think and explain independently. Sampled teachers made six types of Mathematics lesson modifications. Sixty percent of teachers' lesson modifications indicated that teachers did not provide students with sufficient time to complete individual, independent work. Another significant type of lesson modification included teachers not providing students with the opportunity to discuss or explore solutions or wrong answers (47%). Teachers also modified lessons by adding content that was aligned to the lesson objectives (25%) and content that was not aligned to lesson objectives (6%).

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<sup>2</sup> Reference desk review report.

### Teacher Mathematics Lesson Modification Types, Frequencies, Description, Examples

Modification type	Frequency	Description	Exemplar
Individual work	60%	Teacher does not allow students to work independently.	Instead of independent work, teacher asked student to come to the front of the class to solve the problem.
Discussion	47%	Teacher explains without asking students for solutions to mathematics problems. Teacher does not discuss wrong answers.	Teacher explained before letting students discuss possible solutions.
Similar addition	25%	Teacher adds tasks that are aligned to the lesson objective.	In symmetric shapes activity, teacher asked extra questions such as “find symmetric shapes in the classroom.”
Reorganization	11%	Teacher changes order of activities.	Teacher combined problem presentation activity with discussion activity.
Not similar addition	6%	Teacher adds tasks that are not aligned to the lesson objective.	Teacher asked students to write the number 18 “beautifully.”
Other	28%	Teachers omits or substitutes content, skips activity, or misallocates time.	Teacher spent too much time reviewing previous lesson.

In sum, at the beginning of the school year, teachers struggled to reorient their deeply ingrained approach of presenting problems to students at the beginning of the lesson and not letting students explore the problem without prior teacher explanation. As shown below, teachers’ practice improved in this regard by the end of the school year.

**Teacher explanations:** To delve deeper into why teachers made the above lesson modifications, the Program asked teachers to explain the reasoning behind their modifications. Teachers’ explanations were varied, including expressing the need to be mindful of all or some students’ learning needs (43% and 11%, respectively), wanting to keep to their former teaching methodologies (11%), or lacking time to properly prepare for the lesson (11%).

### Teacher Mathematics Explanation Types, Frequencies, Description, and Examples

Modification type	Frequency	Description	Exemplar
All students’ knowledge	43%	Teacher indicates that students either need more practice or more time, or already know the content.	“Today’s lesson is not new for my students. My students know new content so I don’t think I need to provide time after presenting the problem.”
Individual students’ knowledge	11%	Teacher differentiates between “good” and “slow” students (individually or by groups).	“Some students may not understand. That’s why I always ask them to solve problems after discussing problems together.”
Old methodology	11%	Teacher uses methodology that she already knows, or that she is more comfortable with.	“I always use this method.”
Preparation	11%	Teacher states that she does not know how to do an activity or a certain lesson section. Or she does not feel prepared and confuses sections.	“Honestly, I do not know how to organize the lesson.”
Other	23%	Teacher indicates challenges with classroom or time management or does not answer.	“If I discuss each wrong answer, there isn’t enough time.”

Teachers’ explanations point to a pattern. Teachers strove to be attentive to students’ needs and made decisions about what and how to teach based on their perceived students’ needs.

## ULA

At the beginning of school year, teachers mostly modified ULA lessons by either omitting or adding content as they struggled with the timing of ULA lessons and the activities therein. The most predominant type of ULA lesson modifications that teachers made was content omission (42%). In addition, teachers also added content (24%) and changed the teaching methodology (27%).

### Teacher ULA Lesson Modification Types, Frequencies, Description, Examples

Modification type	Frequency	Description	Exemplar
<b>Content omission</b>	42%	Teacher omits content from entire or part of an activity.	Did not ask students to make up phrases/sentences using new vocabulary.
<b>Content addition</b>	24%	Teacher adds tasks that are aligned to the lesson objective.	After reading the 'teacher read aloud' the teacher summarized the story herself.
<b>Change of methodology</b>	27%	Teacher changes the nature of an activity or part of an activity.	Instead of students making up sentences orally, they wrote them down.
<b>Other</b>	9%	Teachers has issues with classroom management or timing.	Spent 3 minutes instead of 15 on an activity.

Almost 70% of ULA lesson modifications were comprised of either content omissions or content additions. This can be attributed in part to the fact that teachers struggled with time management (see below). Even though the TGs include timing for each activity, teachers rushed to complete lessons and in so doing found themselves either having to skip activities or to add activities at the end of the lesson because they finished too soon. The Program addressed these issues of timing during subsequent trainings.

**Teacher explanations:** Similar to Mathematics teachers' explanations of their modifications, ULA teachers' explanations also included being mindful of students' needs (29%). Lack of preparation was the most used explanation by teachers (31%), as corroborated by Program staff and subsequently addressed in future trainings.

### Teacher ULA Explanation Types, Frequencies, Description, and Examples

Modification type	Frequency	Description	Exemplar
<b>Preparation</b>	31%	Teacher states that she is nervous, not ready.	"I was nervous because I was not ready for the lesson."
<b>Knowledge of students</b>	29%	Teacher is mindful of what her students needs.	"My students love this activity. It helps them to learn how to make up words from letters."
<b>Time</b>	15%	Teacher either took too long or rushed or finished ahead of schedule.	"I don't always manage to complete the 'writing for purpose task' and so I assign it for homework."
<b>Other</b>	25%	Teacher states having personal life issues to address.	"I lost my close relative, and I was busy with family gatherings. I could not prepare for the lesson."

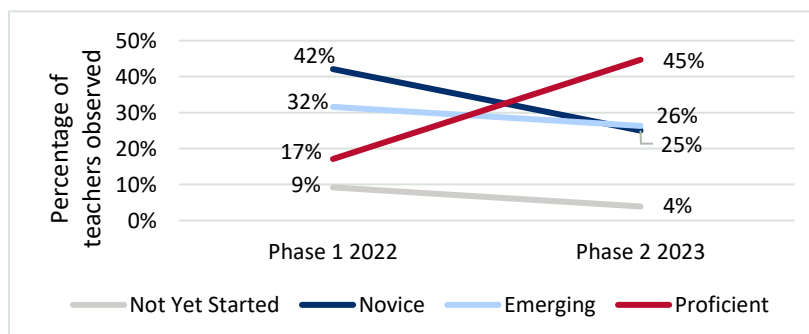
### RQ3. To what degree are ULA and Mathematics teachers applying selected SCSs in the classroom?

#### Overall findings

Teachers' support of student explanation and independent work types of SCSs improved significantly between Phases 1 and 2. However, teachers' modeling of Mathematics problem solving strategies remained unchanged between both phases.

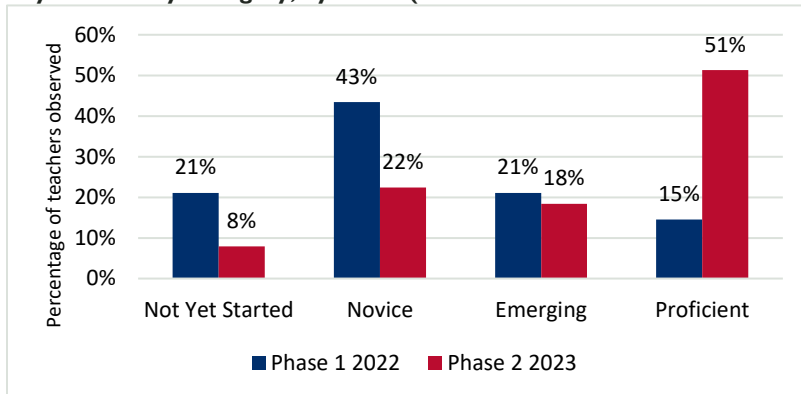
**Overall percentage change of teacher behavior by proficiency category, over time:** Overall, the proportion of teachers in the *Proficient* category increased significantly from 17% to 45%. This indicates that between phases, teachers increased their use of the TGs and demonstrated an increase in the application of selected SCSs.

#### Overall Percentage Change in Teacher Observed Behaviors by Proficiency Category, by Phase (Mathematics)



**Teacher support of student explanation and engagement:** *By the end of the school year a larger number of teachers provided their students with opportunities to think about new mathematics problems independently and to offer their own explanations.* The Program tracked the extent to which teachers supported student explanation and engagement by observing whether teachers: (1) provided students with opportunities and time to think and work on new problems independently, (2) asked students for their answers to the questions, and (3) asked students to explain their answers. In Phase 1, most teachers (43%) fell within the *Novice* category, and only 15% of teachers fell within the *Proficient* category. By Phase 2, however, 51% of teachers achieved *Proficient* status.

**Percentage of Teachers by Proficiency Category, by Phase (Mathematics Problem Presentation and Explanation SCS)**

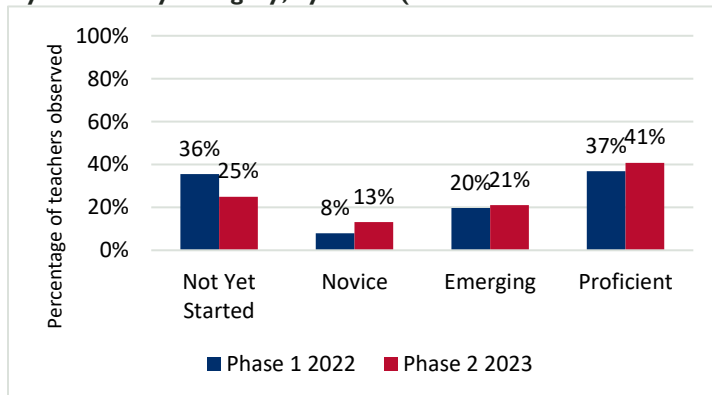


Although in both Phases 1 and 2 teachers did ask students for the answers to the discussion questions (hence the high *Novice* percentage in Phase 1), many teachers only started asking students to *explain* their answers by asking questions like “why and how did you get this answer” in Phase 2.

**Teacher modeling:** *The Program did not observe any significant changes in how teachers modeled problem solving between Phase 1 and 2.* The desired teacher behaviors for modeling problem solving activities are as follows: teachers (1) model how to solve problems in the discussion part of the lesson, (2) engage students in the explanation process, (3) ask yes/no questions, and (4) ask open-ended questions.

Only approximately 40% of teachers achieved the level of *Proficient* in all four of the above-described desired modeling behaviors. Program experts posit that even though modeling was greatly stressed during trainings, teacher modeling did not change significantly because instructions in the TGs were not explicit in this regard. Moreover, given the limited time of the pilot, the Program opted to place greater emphasis on student engagement with explanation and justification together with independent work because these were parts of lessons that were “newest” to teachers. Teachers have traditionally modeled and modeled well, so even though this behavior can always be improved, it was not an overt focus in the materials.

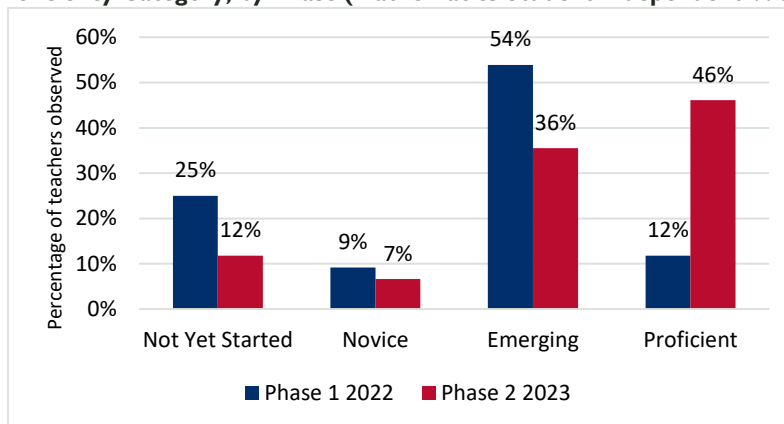
**Percentage of Teachers by Proficiency Category, by Phase (Mathematics Second Discussion Part of the Lesson)**



**Student independent work and student interactions:** *Teachers made significant progress in how they conducted student independent work activities.* Over 85% of teachers fell within the *Emerging* category or below in Phase 1. By Phase

2, over 45% of teachers achieved *Proficient* status. The Program observed how teachers conducted the Mathematics independent work part of the lesson by tracking whether teachers: (1) asked students to do independent work, (2) monitored students while they were working, (3) supported students who were struggling, and (4) gave more tasks to students who finished the task earlier.

**Percentage of Teachers by Proficiency Category, by Phase (Mathematics Student Independent Work Part of the Lesson)**



In Phase 1, the Program observed that almost all teachers conducted student independent work, but a significant majority (88%) of teachers failed to provide students who finished the task earlier with additional tasks. However, in Phase 2, teachers began to engage fast performing students by providing them with additional tasks and applying a more differentiated approach in the classroom. Thus, more teachers were categorized as *Proficient* by Phase 2.

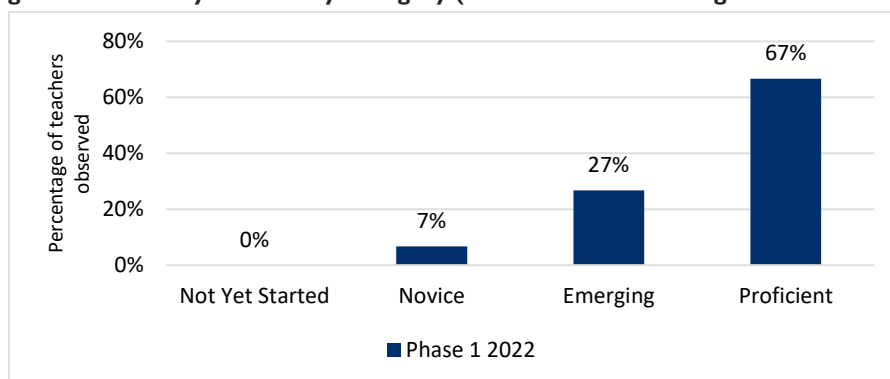
## ULA

### Overall findings

*Teachers showed significant improvement in supporting student explanations and discussions.*

**Teacher modeling:** Teacher modeling in ULA was only observed in Phase 1. A majority of teachers performed well in this part of the lesson (27% *Emerging* and 67% *Proficient*). The Program observed teachers modeling during the phonics activity (reading syllables/words). This was only applicable in the first half of the grade 2 school year. To observe teacher behaviors in this section the Program looked at several elements. These included whether teachers: (1) read the syllables/words themselves first (modeling), (2) confirmed students' understanding, and (3) gave students the opportunity to read independently. Some teachers did not achieve the *Proficient* category either because they did not model the task first or because they did not give students the opportunity to read independently. However, over 90% of teachers reached the *Emerging* category or above (27% *Emerging* and 67% *Proficient*). This was due in large part to the fact that SCSs in this section were very similar to the ones in the former curriculum.

**Percentage of Teachers by Proficiency Category (ULA Teacher Modeling Part of Lesson, Phase 1)**



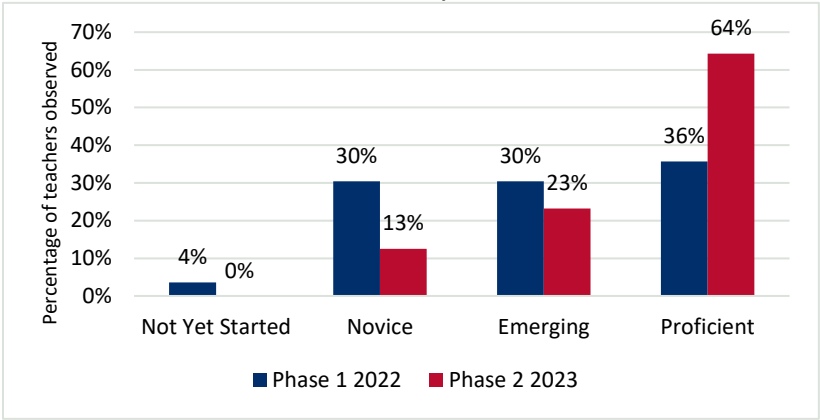
**Teacher support of student discussion and engagement:** The percentage of teachers categorized as *Proficient* in supporting student discussion and engagement almost doubled by Phase 2. To observe and measure teachers' behaviors on



how they supported students’ discussions and engagement, the Program looked at how teachers conducted the reading and listening comprehension part of the ULA lesson. The desired SCSs for this part of the lesson were whether teachers: (1) asked students to predict the content of the text based on the illustrations, (2) asked questions after students read the text, and (3) engaged passive students in the classroom discussion.

In Phase I teachers were equally distributed across the categories of *Novice*, *Emerging*, and *Proficient* (30%, 30%, and 36% respectively). By Phase 2, however, over 60% of teachers achieved the status of *Proficient*. This progress was mainly due to more teachers engaging passive students in the classroom discussion. This teacher behavior increased from 56% in Phase I to 85% in Phase 2.

Percentage of Teachers by Proficiency Category, by Phase (ULA Listening and Reading Comprehension Discussions Parts of the Lesson)



**Student independent work:** The Program observed a significant variation in teachers’ observed behaviors when they were conducting the independent writing part of the lesson. To observe how teachers conducted independent work, the Program looked at the independent writing part of the ULA lesson. As this specific activity is not consistently present in every ULA lesson, at the time of data collection, it was not possible for the Program to predict when or during which part of the day sampled teachers would be teaching the independent part of the lesson. Consequently, the Program could not accumulate a sufficiently large sample size to mitigate the variation within the observations (there were only approximately 20 observations of this particular SCS per phase).

## SUMMARY CONCLUSIONS AND RECOMMENDATIONS

This section provides an overview of the main conclusions and recommendations drawn from the above findings and is presented by research question.

### RQ1: To what extent do the content, instruction, and design of the ULA and Mathematics TGs and STBs support the delivery of lessons and adhere to best practices?

With the exception of some required changes in the areas of language, goals and objectives, inclusion, and clarity and cohesion, The ULA and Mathematics TGs and STBs meet the rigorous, evidence-based evaluation criteria for content, instruction, design, and adherence to student standards.

#### Recommendations

In Phase I, the above suggested changes were reflected in three sets of recommendations: (1) recommendations based on feedback provided by teachers, the Program’s product review group, and the Program technical teams; (2) recommendations that emerged from the desk review; and (3) longer-term recommendations for the Ministry of Preschool and School Education (MoPSE) to consider prior to eventual reprinting. All of these recommendations can be found in the final Desk Review Report.

### RQ2: How are teachers modifying ULA and Mathematics lessons as they teach with the new TLMs in the classroom?

- More than half of teachers' lesson modifications did not provide students with sufficient time to complete Mathematics individual and independent work. Teachers struggled to reorient their deeply ingrained approach of presenting Mathematics problems to students at the beginning of the lesson and were not letting students explore the problem without prior teacher explanation. By the end of the school year, teachers improved in this regard.
- Teachers' lesson modifications showed that they struggled with the new methodology in the Mathematics books. As such, the Program added several features to the TGs to support teachers in applying the new methodology more effectively; for example, an icon was added to remind teachers when to let students work independently.
- In Phase I, almost 70% of ULA lesson modifications made by targeted teachers were comprised of either content omissions or content additions. This can be attributed in part to the fact that teachers struggled with time management. Even though the TGs include timing for each activity, teachers rushed to complete lessons and in so doing skipped or added activities at the end of the lesson because they finished too soon. The Program addressed these issues of timing during subsequent trainings.
- When teaching both Mathematics and ULA, teachers' modifications showed that they strove to be attentive to students' needs and made decisions about what and how to teach based on their students.

## Recommendations

In Phase I, the Program addressed the above findings by implementing the following selected recommendations.

- Added TPD content on effective differentiated instruction.
- Added an icon in TGs to remind teachers when to let students work independently.
- Focused training on providing all students with time to solve problems.
- Embedded reminders in the TGs to allow students adequate time to solve problems independently.
- Focused training on practicing how to ask questions and review.
- Included questions and structured feedback in the quality assurance tools.
- Reinforced the writing lesson procedure in trainings and highlighted key elements of the writing lesson procedure through Telegram posts.

## RQ3: To what degree are ULA and Mathematics teachers applying selected SCSs in the classroom?

Overall, it is possible to conclude that teachers' uptake of the ULA and Mathematics TLMs was successful, especially considering the short one-school-year period in which this pilot took place. This is of even greater note given the magnitude of shift required of teachers in terms of having to absorb a new standards-based curriculum, new content, and new SCSs that were significantly different from those of their previous experience. Specific conclusions follow.

- By Phase 2, overall, the proportion of teachers in the *Proficient* category increased significantly from 17% to 45%. This indicates that between phases, teachers increased their use of the TGs and demonstrated an increase in the application of selected SCSs. This is particularly significant in that teachers substantially increased their proficiency in only one year.
- By Phase 2, teachers' proficiency in providing students with opportunities to think about new mathematics problems independently and for students to offer their own explanations improved significantly and went from 43% *Novice* to 51% *Proficient*.
- The Program did not observe any significant changes over time on how teachers modeled mathematics problem solving. This is likely due to the fact that instructions in TGs were not explicit in this regard and that the Program placed greater emphasis on student engagement with explanation and justification together with independent work because these were parts of the lessons that were "newest" to teachers.
- Teachers made significant progress in how they conducted independent work activities with Mathematics student. Over 85% of teachers fell within the *Emerging* category or below in Phase I. By Phase 2, over 45% of teachers achieved *Proficient* status.
- A majority of teachers performed well when modeling the phonics part of the ULA lessons (27% *Emerging* and 67% *Proficient*). This was due in large part to the fact that SCSs in this section were very similar to the ones in



the former curriculum.

- The percentage of teachers categorized as *Proficient in* supporting student ULA discussion and engagement almost doubled by Phase 2. This was mainly due to more teachers engaging passive students in the ULA classroom discussions.
- The Program observed a significant variation in teachers' observed behaviors when they were conducting the independent writing part of the lesson. The sample was not large enough to mitigate the variation and provide sufficient statistical significance.

## Recommendations

- Given that changes in teacher behavior of this magnitude take time and commitment for full uptake at scale to take root, MoPSE should continue to monitor teachers' application of new SCSs with similar longitudinal studies to better understand the relationship between new materials, TPD, integration of new SCS into classroom practices, and timing.
- The Program's robust evidence-based piloting approach, which was based on existing education systems and priorities, has proven to be an enormously powerful strategy for improving TLMs and strengthening teachers' student-centered teaching behaviors. MoPSE should consider adapting and/or adopting a similar robust pilot approach when introducing new materials and accompanying TPD.
- Future interventions should ensure teacher modeling instructions are clear and focus on the more challenging teaching strategies.
- Given that teachers were well versed in phonics instruction, future interventions should better identify teachers' strengths prior to developing materials. In so doing, future interventions can be more strategic on what new SCSs to focus on.
- If the lesson structure of TLMs is very varied, future studies should ensure a sufficiently large sample to accommodate for this variation and to ensure that all parts of the lessons are observed.
- To better determine whether progress is achieved due to the Program's interventions or due to other intervening variables, future studies would ideally include a control group.