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ICT Endline Assessment May 2023

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Uzbekistan Education for Excellence Program

ICT Endline Assessment Report

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ACRONYMS AND ABBREVIATIONS

EOY	End of Year
FSU	Florida State University
ICT	Information and Communication Technology
MoPSE	Ministry of Preschool and School Education
MSU	Mississippi State University
RTI	RTI International
SME	Subject Matter Expert
TLM	Teaching and Learning Material
TPD	Teacher Professional Development
USAID	United States Agency for International Development

EXECUTIVE SUMMARY

This information and communication technology (ICT) assessment measured the competency of 1,244 grade 9, 10, and 11 students from the beginning to the end of the 2022–2023 school year in two regions. This longitudinal study measured the impact of student learning outcomes over the course of a year. The U.S. Agency for International Development (USAID) Uzbekistan Education for Excellence Program conducted a baseline assessment at the beginning of the school year in September 2022 and an endline assessment at the end of the school year in May 2023. These assessments included a knowledge examination of the content of newly introduced ICT standards and textbooks. The examination was based on standards and proficiency was defined as 78%, 79%, and 77% correct responses in the assessment for grades 9, 10, and 11 respectively by the subject matter specialists in ICT. Additionally, to better measure the progress during the early years of implementation of the new curriculum, the Program also set intermediate proficiency levels at 50%, 40%, and 40% for grades 9, 10, and 11 respectively.

The analysis of intermediate proficiency results shows progress between the baseline and endline assessments; grade 9 students performed better, by close to 10 percentage points, by the end of the school year. Grade 10 students' proficiency improved by 7 percentage points from the start to the end of the school year. No statistically significant changes in results were observed among grade 11 students (**Table 1**). However, none of the students achieved the proficiency levels of 78%, 79%, and 77% (for grades 9, 10, and 11, respectively).

Table 1. Percentage of Students Achieving Intermediate Proficiency Levels Between Baseline and Endline

	Baseline	Endline	Gain	Effect Size
Grade 9	20%	29%	9.9%***	9.9%***
Grade 10	26%	33%	7.1%*	7.1%*
Grade 11	25%	30%	4.5%	4.5%

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

Score differences across the five ICT domains (Digital Literacy and Citizenship, Technology Applications, Social Impacts, Computing, and Computing Systems) show that grade 9 students improved across all domains, apart from Social Impact. Grade 10 students showed progress only in the domain of Digital Literacy and Citizenship.

The results show differences in improvement for boys and girls. Girls showed significant gains from baseline to endline in the domain of Computer Systems and showed lower gains relative to boys across all other domains. Boys showed relatively even improvement across all domains.

The results show that there were consistent differences in the scores of urban and rural students. Students in urban schools performed relatively better than their peers in rural schools. This is especially noticeable in the domain of Computer Systems.

SECTION 1: BACKGROUND

1.1 PROGRAM OVERVIEW

The Government of Uzbekistan Ministry of Preschool and School Education (MoPSE), previously the Ministry of Public Education, is committed to an ambitious program of systematic and comprehensive reforms. The country aims to create an education system that can produce graduates with critical thinking, problem solving, and practical skills that will enable them to succeed.

The Uzbekistan Education for Excellence Program is implemented by a consortium of implementing partners including RTI International (RTI) as the Consortium lead, Florida State University (FSU), and Mississippi State University (MSU). The RTI Consortium provides the expertise and experience needed to help the MoPSE achieve and sustain three overarching results:

1. Improved Uzbek Language Arts and Mathematics outcomes in grades 1–4.
2. Enhanced Information and Communication Technology (ICT) instruction for grades 5–11; and
3. Improved English as a Foreign Language instruction in grades 1–11.

Cross-cutting themes include capacity building, gender equality and social inclusion, transparency, local ownership, and sustainability.

Under the second results area of enhancing ICT instructions for grades 5–11, the Program piloted a new ICT curriculum in 213 schools in the 2021–2022 school year. This process included piloting new teaching and learning materials (TLMs), including student standards, student textbooks, and teacher guides, complemented by the Program’s teacher professional development (TPD) approach.

The Program continued the second year of piloting by selecting a sub-set of 10 schools that received post-pilot revised TLMs. In addition, the Program piloted the provision and use of project-based lesson plans by ICT teachers and a new classroom approach to book distribution.

SECTION 2: STUDY DESIGN

2.1 PURPOSE OF THE STUDY

The purpose of the endline assessment is to evaluate the ICT knowledge of the students at the end of grades 9–11 and compare results with those of the baseline assessment conducted at the beginning of the school year. The Program will use these data to measure the impact of the new ICT curriculum, developed under the Program, on student learning outcomes. The results of the assessment will inform the MoPSE in its efforts to effectively scale-up the new curriculum nation-wide as well as contributing to a culture of benchmarking by administering standardized end-of-year (EOY) assessments.

The Program will also measure progress by the increase in the percentage of students achieving intermediate proficiency levels between baseline and endline. Moreover, the Program will use the results of the assessment to evaluate gaps in students' acquisition of curriculum content by the end of the school year.

The results of the assessment and gains from baseline to endline will be analyzed in the disaggregation of grades, gender, ICT curriculum domains, and location of schools (urban or rural).

2.2 RESEARCH QUESTION

The overall goal of the ICT assessment is to evaluate the Program's impact on students' learning. To this end, the Program will compare baseline data collected in September 2022¹ with endline data collected in May 2023. To achieve this goal, the following research question will be addressed as part of the endline assessment:

- What is the overall impact of the Uzbekistan Education for Excellence Program in grades 9, 10, and 11 on ICT knowledge?

The Program ICT assessment was designed to align with international standards that were customized for the Uzbekistan educational system.

To get more insights into the findings of the assessment and combine the reflections of various stakeholders, the Program worked with over 20 ICT subject matter experts (SMEs), teachers, trainers, and methodologists; ICT subject-related specialists; several MoPSE officials; and school administrators to gather insights into the preliminary findings and integrate those learnings into this report.²

2.3 MEASURING IMPACT

In standards-based education, summative EOY testing is an objective metric of learning and instruction. With the ICT baseline and EOY exams, the Program is contributing to a culture of benchmarking by measuring ICT student learning against expectations of what students should know and be able to do at the end of each grade. The information gained from baseline and EOY testing are summarized as part of this report and can inform the nationwide rollout of the new Program-developed ICT curriculum, thus playing an important role in the holistic improvement of education in Uzbekistan.

¹ The ICT baseline assessment September 2022 report contains results of the baseline assessment and adaptation/piloting of the ICT assessment items.

² Learning to Adapt Symposium July 18–19, 2023.

The ICT assessment was designed to be conducted in Program schools at two time points, returning to the same schools and grades and sampling the same students each time. This longitudinal study measured the impact of student learning outcomes over the course of a year. A comparison of the means, gains, and effect size analysis was applied to measure impact and its significance.

2.4 PROFICIENCY

In September 2022, ICT SMEs set proficiency levels for grades 9–11 at 78%, 79%, and 77% correct responses in the assessment for grades 9 to 11, respectively. However, because the Program-developed ICT standards and curricula are new to Uzbekistan and implemented in grades 5–11 all at once, Uzbekistan students are not expected to show proficiency levels after just two years of implementation. Thus, to measure the progress more accurately, the SMEs defined intermediate proficiency levels at 50%, 40%, and 40% correct answers in the assessment for grades 9–11, respectively (**Table 2** summarizes the proficiency levels).

For more detailed information on the proficiency levels, please refer to the Program ICT Baseline Assessment September 2022 report.³

Table 2. Proficiency and Intermediate Proficiency Levels by Grade

	Grade 9	Grade 10	Grade 11
Proficiency cut scores	78%	79%	77%
Intermediate proficiency cut scores	50%	40%	40%

2.5 SAMPLING

The Program sampled 10 schools (6 in Namangan and 4 in Sirdaryo Region) randomly from the population of 213 Program intervention schools, with a weighted sample of 3 urban and 6 rural schools. The Program tried to sample at least 30 boys and 30 girls per grade from each school. In the cases where a school was small and the number of students for each gender was close to or fewer than 30, the Program included all the students in the assessment at the school. This sample size was much larger than the minimum required sample size of around 210 students in total per grade because the Program anticipated the possibility of a high attrition rate among higher-grade students. Thus, the Program oversampled to mitigate this risk.

Table 3 presents the actual number of students sampled for the endline assessment.

Table 3. School Sample Characteristics by Region, Grade, and Gender

Region	Namangan (n = 789)			Sirdaryo (n = 455)		
Grade	9	10	11	9	10	11
Girls	148	157	143	87	100	54
Boys	146	104	91	81	80	53
Total	294	261	234	168	180	107

³ Ibid.

During the baseline assessment, the assessment team had a replacement students list that was also randomly generated in case any students originally sampled were not present at the school during the assessment. As the study was longitudinal, students who participated in the baseline assessment were included in the endline assessment in May 2023.

2.6 PROCTORS TRAINING AND DATA COLLECTION

The Program constructed two assessment teams each with five proctors and one Program staff member in each team. The Program hired a total of ten proctors and conducted an orientation workshop with the proctors the day before the assessment started. The proctors were also given the instruction manual on conducting the assessment at the school level several days before the orientation to familiarize themselves with the process. The main responsibilities of the proctors included setting up the assessment room; providing information to students about the assessment according to proctor scripts; distributing tablets to students with assessment application open; monitoring students during assessment; making sure students submitted their responses; and uploading the students responses to the servers. Since the assessment process was very structured, and the Program staff always accompanied the proctors, a one-day orientation was considered sufficient. One assessment team visited one school per day and finished the assessment for the school in one day. The data collection took place from April 15–20, 2023.

SECTION 3: MAIN RESULTS

3.1 RESULTS, PROFICIENCY, AND PROGRESS

The comparison of baseline and endline results shows that a statistically significant difference is only present among grade 9 and 10 students. The percentage of grade 9 students meeting intermediate proficiency increased by almost 10 percentage points, while among grade 10 students it increased by 7 percentage points.

Table 4 presents the average percentage of questions answered correctly by the students between baseline and endline across the grades assessed. The table also presents the average gain between baseline and endline together with effect size. The effect size presents the impact by grades using a standardized measure of the standard deviation. This industry standard approach provides comparability of the results between grades and measures. The Program determined the impact of the difference in terms of small, medium, and large effects of 0.2, 0.5, and 0.8 standard deviations, respectively.⁴

The results presented show that grade 9 students improved from an average correct response of 40.5% to 44.1%. This can be interpreted as on average two more correct answers in the assessment. This progress has an effect size of 0.34 standard deviations, which is an impact of almost medium size. Grade 10 students also showed improvement, but relatively lower gains than grade 9 students. Grade 11 students on the other hand did not show any improvement from baseline to endline.

Table 4. Average Baseline and Endline Scores

	Baseline	Endline	Gain	Effect Size
Grade 9 (n=462)	40.5	44.1	3.6***	0.34
Grade 10 (n=441)	33.4	35.2	1.8*	0.16
Grade 11 (n=341)	32.9	33.6	0.7	0.06

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

The Program anticipated relatively lower gains in grade 10 and 11 as the content of the curriculum in these higher grades is based on content from grade 9 and below to a greater extent than that used in grade 9. In the reflection discussion on the findings, the SMEs, teachers, and trainers stated the same rationale as the primary reason for the differences in the gains across grades. Additionally, SMEs stated and mostly agreed that grade 10 and 11 students heavily focused on preparing for university entrance exams. As the ICT subject is not part of university exams, the students in higher grades would have focused less on this subject and spent as much time as possible on other subjects that are part of their examination.

None of the students could achieve proficiency levels of 78%, 79%, and 77%, respectively, for grades 9, 10, and 11 during both baseline and endline assessments.

⁴Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences*. Jacob Cohen. 2nd ed. Hillsdale, N.J.: Erlbaum Associates. <http://dx.doi.org/10.4324/9780203771587>.

However, the results show progress in the percentage of students achieving intermediate proficiencies.

Table 5 shows the percentage of students achieving intermediate proficiency levels during baseline and endline. The results show that by the end of the school year almost 10 percentage points more students were able to achieve intermediate proficiency levels in grade 9, along with 7 percentage points more grade 10 students. These results show high statistical significance.

The increase of 4.5 percentage points in grade 11 students' achievement of intermediate proficiency is not statistically significant.

Table 5. Percentage of Students Achieving Intermediate Proficiency Levels Between Baseline and Endline

	Baseline	Endline	Gain
Grade 9	20%	29%	9.9%***
Grade 10	26%	33%	7.1%*
Grade 11	25%	30%	4.5%

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

3.2 RESULTS BY ICT DOMAIN

The results by each ICT domain show that the performance of grade 9 students improved across all domains equally with the exception of the Social Impacts domain. In grade 10, the observed gains in the endline scores were all due to progress in student performance in one domain: Digital Literacy and Citizenship.

The Program developed assessment items for each domain in the new ICT curriculum. The number of assessment items for each domain and in each grade was proportional to the number of lessons dedicated for that domain in that grade. **Table 6** presents the breakdown of the 40 assessment items for each grade by domain.

Table 6. Number of Questions Under Each ICT Assessment Domain

Domains	Number of Questions		
	Grade 9	Grade 10	Grade 11
Digital Literacy and Citizenship	7	2	2
Technology Applications	9	9	15
Social Impacts	10	7	15
Computing	11	16	6
Computing Systems	3	6	2
Total Number of Questions	40	40	40

Figure 1 presents the results of grade 9 students by domain between baseline and endline. As the graph depicts, there was a proportional outward shift across all domains except for the Social Impact domain. Grade 9 students performed relatively well in the domain of Technology Applications, in both baseline and endline (51% in baseline to 57% in endline).

Relatively higher results were also observed in the domain of Digital Literacy and Citizenship.

The Program discussed the domain-wise differences in the scores with SMEs. To explain why the domain of Social Impact did not progress, SMEs recalled the challenges the Program faced during initial ICT TPD activities, which were exacerbated by the coronavirus pandemic. A main challenge was ICT teachers being unfamiliar with some of the content of the new curriculum, while the teacher training sessions were mainly focused on new teaching strategies and not on learning it. SMEs stated that especially the content under the Social Impact domain was new to ICT teachers as it was not part of the previous curriculum. Topics covered under this domain included ethical considerations, economic impact, legal usage, and privacy. The domains of Technology Applications and Digital Literacy and Citizenship included topics that ICT teachers were familiar with from the previous curriculum. See **Annex A** for detailed domain-wise scores for all grades with effect sizes.

Figure 1. Average Baseline and Endline Scores of Grade 9 Students by Domain

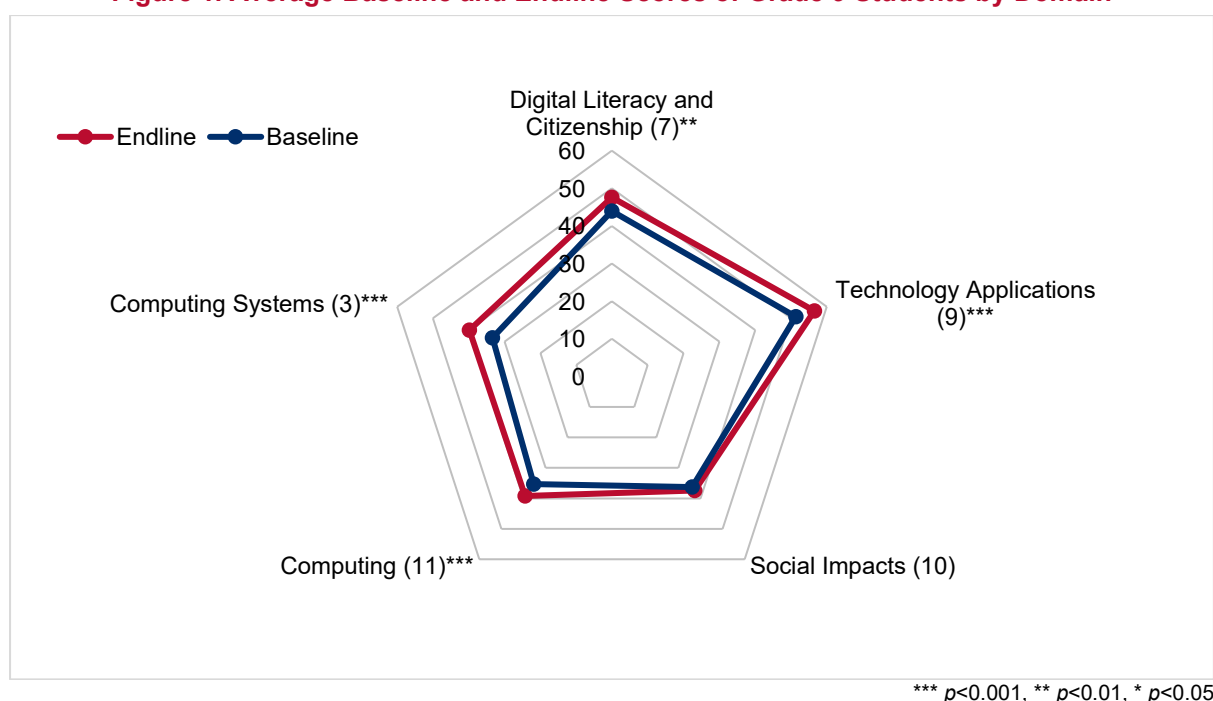
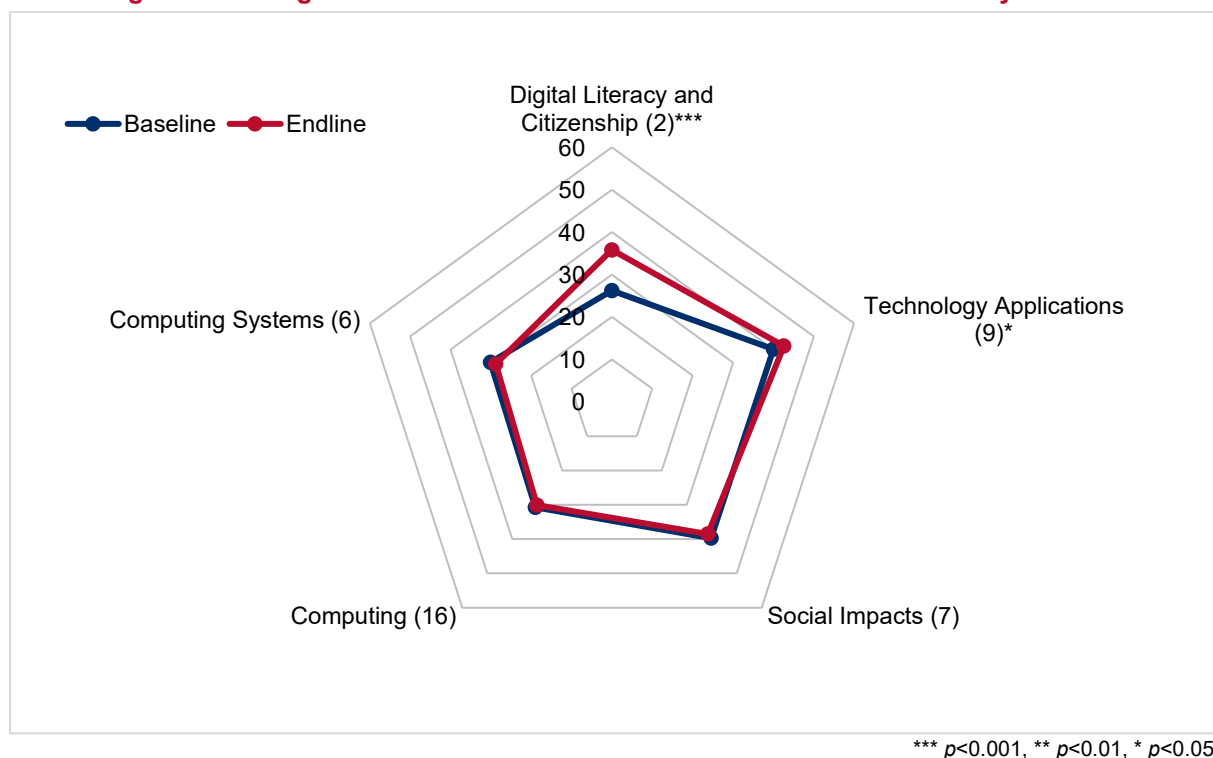


Figure 2 presents the scores of grade 10 students across domains between baseline and endline. The results show that the performance of grade 10 students in the EOY assessment improved, with a noticeable margin only in the domain of Digital Literacy and Citizenship. Average scores of students across all other domains remained almost at the same level. Although the progress in the domain of Technology Applications was statistically significant, the magnitude of the change was small.

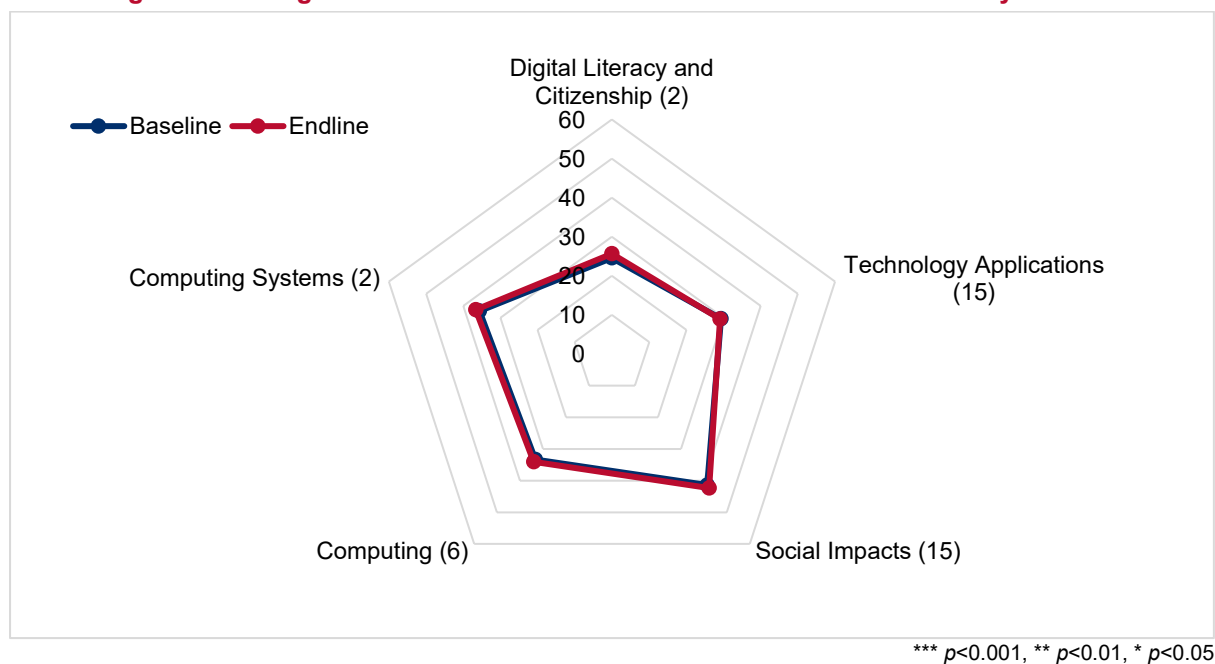
Figure 2. Average Baseline and Endline Scores of Grade 10 Students by Domain



SMEs provided the same rationale as that for the results from grade 9 to explain the results and progress dynamics in the performance of grade 10 students.

For grade 11, the results did not show any noticeable progress in student performance in any of the five domains (see **Figure 3**).

Figure 3. Average Baseline and Endline Scores of Grade 11 Students by Domain



3.3 RESULTS BY GENDER

The Program did not observe any noticeable differences in the overall scores of boys and girls in both baseline and endline (see Table 7). However, the score gains between baseline and endline by domain differed significantly between girls and boys in grade 9.

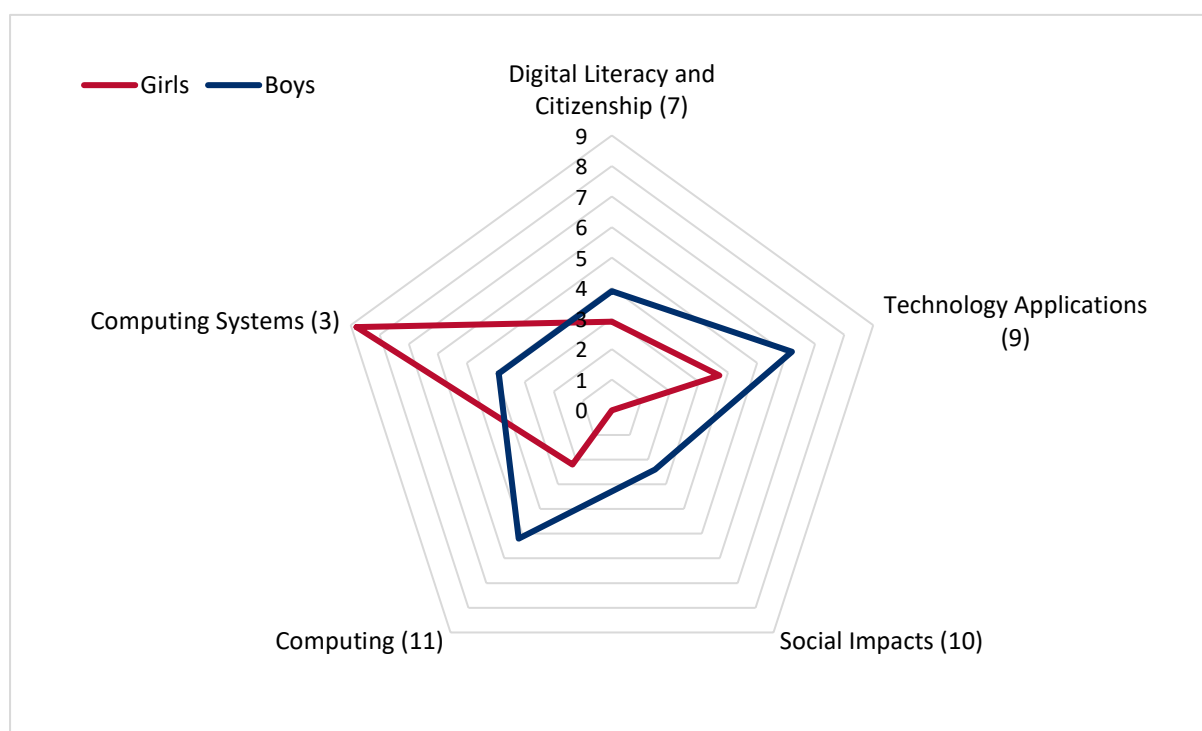
Table 7. Average Baseline and Endline Results by Gender

Grade	Gender	Baseline	Endline	Gain	Effect Size
Grade 9	Girls	41	44	3.5***	0.32
	Boys	39	44	4.3***	0.38
Grade 10	Girls	33	35	2.2*	0.20
	Boys	33	35	1.8	0.16
Grade 11	Girls	33	33	0.4	0.04
	Boys	31	34	2.3	0.19

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

Figure 4 presents the domain level gains between baseline and endline among grade 9 students. As the results show, boys progressed evenly across all domains, with relatively higher improvement in the domains of Technology Applications and Computing. However, among grade 9 girls, the progress was highly concentrated in the domain of Computer Systems, showing significantly higher gains relative to boys in this domain. Girls showed relatively lower gains than boys in all other domains.

Figure 4. Average Percentage Gains by Domain Between Baseline and Endline Among Grade 9 Students



Teachers and trainers, when asked to interpret the results, reinforced the existing stereotypes to explain the differences in the performance of boys and girls in the assessment. The Program considers that more research is needed to explore the reasons behind the difference in how boys and girls are performing across the various domains.

3.4 RESULTS BY LOCATION AND SCHOOL

The results show that students at schools located in urban areas performed slightly but consistently better relative to their peers in rural schools across all domains.

The Program looked at score differences between urban and rural schools for any significant differences. The results show that students at schools that are in the urban areas performed consistently higher across all domains, with an average of around a 4 percentage point difference (see **Figure 5** and **Figure 6**).

However, in the domain of Computer Systems, the difference between urban and rural school students was noticeably higher, with an 8-percentage point difference in the baseline and a 9-percentage point difference in the endline results.

ICT teachers and trainers considered the difference in access to computers, Internet, and electricity as a possible reason for the differences in the scores of urban and rural students. However, the score differences were not as high in domains like Technology Application and Computing, which involves more hands-on practice and application, compared to those in the domain of Computing Systems, which mostly involves communication skills. Thus, there might be other factors that are influencing the differences in student performance in urban and rural schools rather than infrastructure.

Figure 5. Average Scores by Location of School at Baseline Among Grade 9 Students

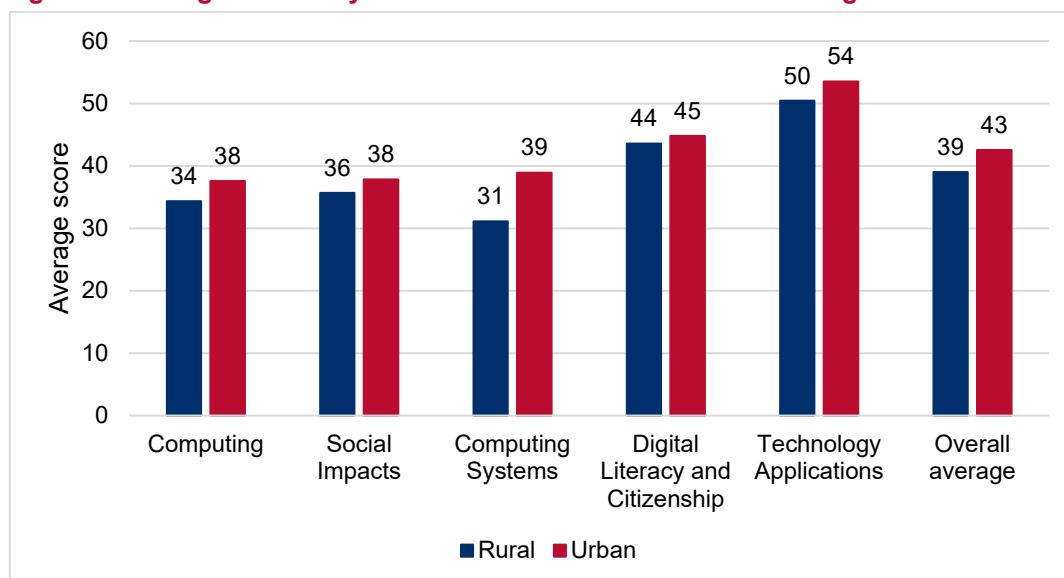
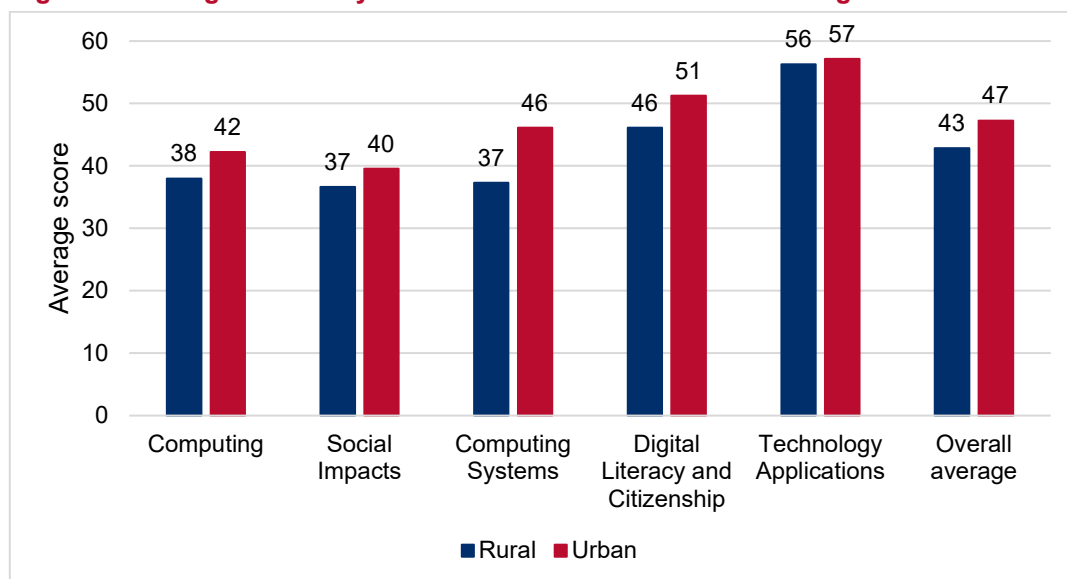
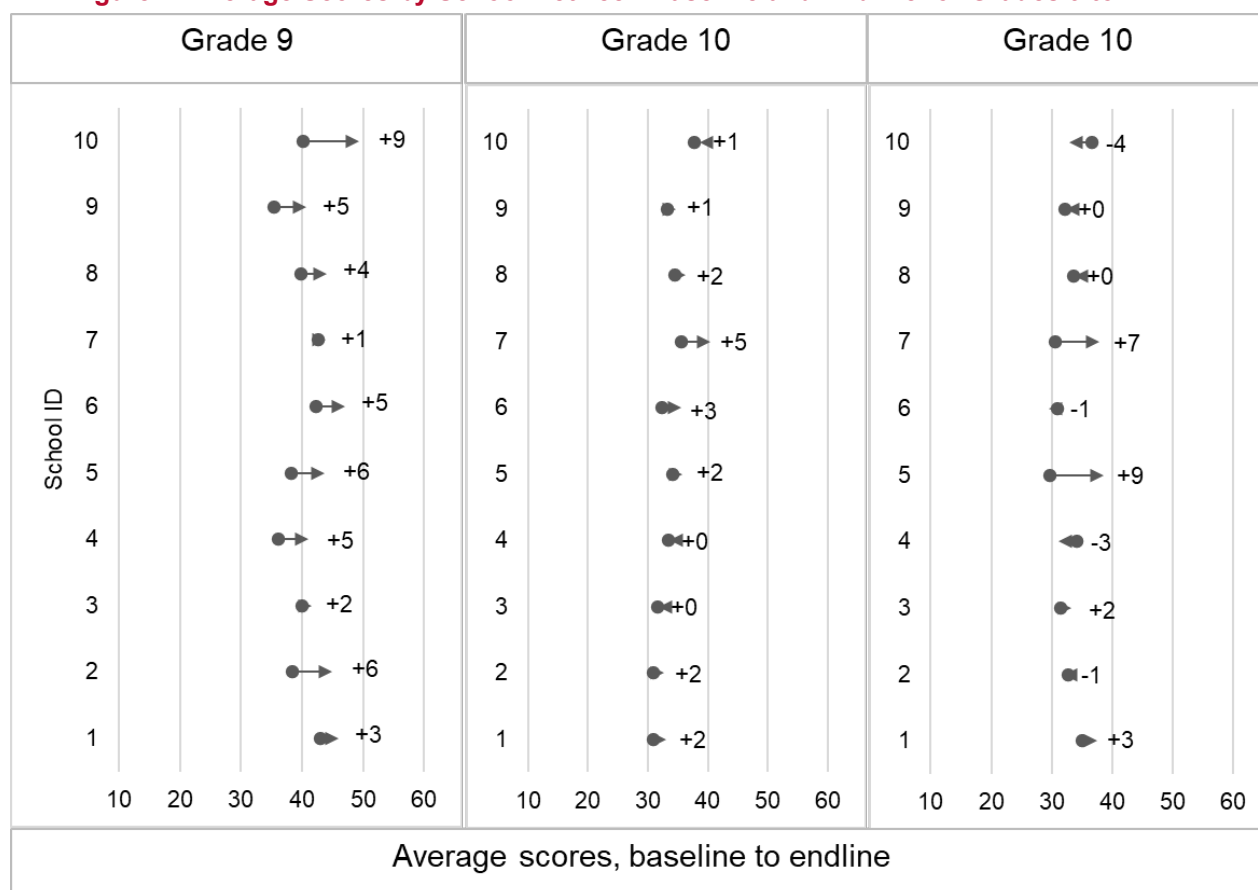


Figure 6. Average Scores by Location of School at Endline Among Grade 9 Students



The Program analyzed the data from each school to see if there were any schools with outstanding performances across all grades for a potential best practice case study. However, none of the schools stood out in the performance of students across all grades (see **Figure 7**). Although some schools showed relatively higher gains among grade 9 students than other schools, a similar pattern was not observed among other grades in the same school.

Figure 7. Average Scores by School Between Baseline and Endline for Grades 9 to 11



*School names were converted to numbers during the analysis process. The numbers assigned to schools are generated randomly and are not related to actual school names in any way.

SECTION 4: CONCLUSIONS AND RECOMMENDATIONS

This section presents conclusions of the findings and provides relevant recommendations.

ICT student learning outcomes improved in grade 9, improved less so in grade 10, and improved not at all in grade 11 from baseline to endline using the Program-developed new ICT curriculum. These results are not surprising as the content of grade 11 is the most complex and builds on a foundation of learning in earlier grades, which, due to the recent introduction of the new curriculum, the students in grade 11 did not benefit from. The content in the curriculum also spirals and builds in complexity beginning in grade 5. It is anticipated that students that begin with the new curriculum in grade 5 and proceed through the full curriculum will likely achieve higher gains and meet proficiency with a sound foundation in all the domains. The Program recommends continuing the EOY assessments to measure progress over time and identify gaps in student learning outcomes at each grade. This will enable the MoPSE to efficiently respond, with an adaptive management approach, to the needs of the teachers and students in the nation-wide roll-out of the new curriculum. Additionally, the MoPSE can benefit from the capacity developed as part of this ICT assessment in developing standardized EOY assessment and benchmarking mechanisms for other subjects.

ICT teachers struggled with learning the new curriculum content. Some teachers taught themselves the topic before teaching it to the students. At the same time, teachers had to master new teaching approaches and strategies while also learning the content. Because most ICT teachers have other specializations and training, such as teaching physics or mathematics, teaching ICT is often a secondary specialization. The new Social Impact domain presented particular difficulties for teachers, and student outcomes under this domain were notably low. The Program recommends training on the content for ICT teachers. Also, the country's preservice teacher training should align with the new curriculum and project-based approaches to meet future technology advances.

There are statistically significant gaps in ICT learning between boys and girls. Boys outperformed girls in terms of gains between baseline and endline across several domains. Girls outperformed boys in the domain of Computing Systems. The Program recommends that more research is conducted to further understand the barriers and opportunities in eliminating gender disparities in ICT learning outcomes. Moreover, the Program also recommends promoting teachers to apply more inclusive teaching strategies to encourage girls in learning ICT.

There is a difference in learning outcomes for students in urban and rural schools. Students attending urban schools performed consistently better than their peers in rural schools. Although many teachers and trainers believe that the difference in performance of students in rural and urban schools can be explained by the difference in the technological infrastructure, the results show that there might be other factors that are influencing the gap in the results. The Program recommends further researching the difference in learning outcomes between urban and rural schools and possible influencing factors.

ANNEX A

Table 8. Detailed Baseline and Endline Results by Domain and Grade

Grade (students sampled at endline)	Domain (number of questions by grade)	Baseline	Endline	Gain	Effect Size
9 (n=462)	Digital Literacy and Citizenship (7) **	44	48	3.6**	0.19
	Technology Applications (9) ***	51	57	5.2***	0.29
	Social Impacts (10)	36	37	1.2	0.08
	Computing (11) ***	35	39	3.9***	0.27
	Computing Systems (3) ***	33	40	6.5***	0.25
	Average Baseline Scores	40.5	44.1	3.6***	0.34
10 (n=441)	Digital Literacy and Citizenship (2)	26.2	35.8	9.6***	0.28
	Technology Applications (9)	40.0	42.6	2.6*	0.15
	Social Impacts (7)	39.7	38.5	-1.2	-0.07
	Computing (16)	30.7	30.1	-0.6	-0.05
	Computing Systems (6)	30.1	28.8	-1.3	-0.07
	Average Baseline Scores	33.4	35.2	1.8*	0.16
11 (n=341)	Digital Literacy and Citizenship (7, 2, 2)	24.6	25.7	1.1	0.04
	Technology Applications (9, 9, 15)	29.3	29.1	-0.3	-0.02
	Social Impacts (10, 7, 15)	41.4	42.3	1.0	0.06
	Computing (11, 16, 6)	33.3	34.1	0.7	0.04
	Computing Systems (3, 6, 2)	35.6	36.7	1.0	0.03
	Average Baseline Scores	32.9	33.6	0.7	0.06