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Supporting Coding among Rwandan Adolescents & Teachers through the Curriculum & Clubs Heading (SCRATC2H) for Rwanda 2050

Baseline Report

May 2021

PREPARED BY THREE STONES INTERNATIONAL, RWANDA LTD.

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REB | RWANDA BASIC EDUCATION BOARD

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Acronyms

CPD	Continuous Professional Development
ICT	Information and Communication Technology
KAP	Knowledge Attitudes and Practices
OERs	Open Education Resources
RCA	Rwanda Coding Academy
REB	Rwanda Basic Education Board
STEM	Science Technology Engineering and Mathematics
TSI	Three Stones International
YBE	Year Basic Education

Executive Summary

VVOB Rwanda, in partnership with Rwanda Basic Education Board (REB) and the Rwanda Coding Academy (RCA) is piloting a project to be implemented in 2 years in Kayonza district with the financial support of the Belgian Government through ENABEL. The aim of the Scratc²h 2050 pilot project is to equip at least 135 ICT and STEM teachers of approximately 45 secondary schools in Kayonza district with the competences needed to initiate and facilitate after school Scratc²h 2050 coding clubs for secondary school learners and to integrate Scratch into ICT and STEM lesson plans. To this end, VVOB will train secondary school STEM and ICT teachers on coding and its benefits through blended learning. After training, they will continue to develop professionally through participation in ongoing online and biannual face-to-face ScratchEd Meetups supported by RCA.

The project is built around four pillars:

1. Development of a Scratc²h 2050 pedagogical guide, complemented by ICT and STEM lesson plans and Open Education Resources (OERs)
2. Continuous Professional Development (CPD) trajectory for ICT and STEM teachers
3. Professional learning communities of ICT and STEM teachers
4. Establishment of after school Scratc²h 2050 coding club

In order to evidence the extent to which teachers have the necessary competences to facilitate successful Scratc²h 2050 clubs and integrate Scratch in the classroom, a baseline Knowledge, Attitude and Practices (KAP) survey was carried out in April-May 2021 by Three Stones International (TSI). The survey was conducted prior to the start of the digital literacy training and Scratch coding training for teachers and was carried out with 160 STEM and ICT teachers from 52 secondary schools that were selected to participate in the pilot project in Kayonza District. The baseline design is intended to complement the VVOB Needs Assessment conducted in December 2020 to determine external factors that may influence the project outcomes, including school leadership support for clubs and use of digital technology. In addition, the findings have been used to set the baseline figures for relevant indicators as per the project logical framework (see Table 1).

Table 1: Scratc²h 2050 Pilot Project Indicators with Baseline Measures

Indicator	Total	Female	Male
Percentage and number of vulnerable groups who have achieved at least a <u>minimum</u> level of proficiency in digital literacy skills as proposed in the Digital Literacy Global Framework (TEACHERS).	63% (101/160)	57% (21/37)	65% (80/123)
Percentage and number of trained teachers who have achieved a high proficiency in terms of content creation (coding).	0.6% (1/160)	0% (0/37)	0.8% (1/123)
Percentage and number of trained teachers who report to feel competent to facilitate after school Scratc²h coding clubs.	28% (45/160)	19% (7/37)	31% (38/123)
Percentage and number of trained teachers who report to feel competent to integrate Scratch into STEM/ICT lesson plans.	22% (35/160)	19% (7/37)	23% (28/123)

The analysis is divided into 6 broad categories: teacher background, teacher environment, content knowledge, attitudes, self-efficacy and practices. These categories are distributed across 4 main topics including Digital Literacy, Scratch, School Clubs and Scratch/ Coding in the Classroom. For each category and topic, an assessment score was calculated to use as a reference for change between KAP at baseline and endline. Findings highlight that, while teachers have low baseline knowledge in Scratch and, subsequently lower rates of self-efficacy to perform tasks using Scratch or solve problems when using Scratch, they have a generally positive attitude towards coding. The majority of teachers report never having led a school club (58%), which is reflected in both low assessment scores for confidence to lead a club and current practices.

Table 2: KAP Findings by Assessment Area

Category	Average Score on 100-point Scale		
	Total	Female	Male
School Environment			
Environment for Digital Literacy	40	32	42
Content Knowledge			
Digital Literacy	67	61	69
Scratch Knowledge	10	8	11
Attitudes			
Enjoyment of Scratch/ Coding *(of those who have used Scratch)*	51	53	50
Importance of Scratch/Coding in the Classroom	55	53	56
Self-Efficacy			
Confidence to perform tasks using Scratch	14	12	14
Confidence to solve problems when using Scratch	16	12	17
Confidence to lead a Club	33	23	36
Confidence to integrate Scratch into lesson plans	30	24	32
Practices			
Leading Clubs	26	19	28
Incorporating Scratch/ Coding in Lessons	39	31	42

Scores across all areas assessed highlight room for further improvement on digital literacy and coding skills. The majority of teachers surveyed (72%) do meet the minimum level of proficiency for digital literacy skills, however only 53% meet high level of proficiency for digital literacy skills and 1.3% meet the minimum proficiency for Scratch and only 0.6% meet high proficiency. While proportionally, fewer female teachers meet the minimum level of proficiency for digital literacy as compared to males, the difference between them is 10%, this gap widens to 27% when looking at those teachers who have achieved a high level of proficiency. Female teachers were also less likely to have previously used Scratch (41%) as compared to their male colleagues (50%), however scores on the Scratch assessment were low for both genders likely reflecting a lack of formal training and experience.

Female teachers were also less likely to report that they are or have previously led a club at their schools as compared to their male colleagues (35% of females as compared to 44% of males) or are currently leading a STEM/ICT club (8% of females and 20% of males). In addition, while both have similar attitudes towards the use of coding or Scratch in the classroom, male teachers are more likely to be currently using coding or Scratch in the classroom and exhibit greater self-efficacy to do so. While only comprising 30% of the teachers enrolled in the pilot project, female teachers may require additional support to develop similar "starting" levels of digital literacy and coding skills as compared to their male colleagues and support when initiating coding clubs. This could take place through additional check-in meetings with project staff and coding students from RCA.

The main challenge that may threaten the ability of the project to achieve its key objectives are the school-based environmental factors. One quarter of teachers surveyed reported that their school never has electricity, more than one third report that they never have access to computers for student use (38%) or teacher use (36%) and nearly half (48%) report that they never have access to the internet. Without access to electricity and computers for both teacher and student use, there will be few opportunities for both to practice and gain the skills and incorporate Scratch in the classroom, particularly at public and government aided schools. While Scratch can be downloaded to devices and operated off-line, students will still require access to a charged computer. The project has already engaged school leaders and distributed computers to participating schools, however further monitoring will be required to ensure teachers and students are accessing these computers.

Introduction

VVOB – *education for development* has been sustainably improving education systems worldwide in partnership with ministries of education for over 35 years. VVOB works towards improving the quality of education in nine partner countries (Cambodia, DR Congo, Ecuador, Rwanda, South Africa, Suriname, Vietnam, Zambia, and Uganda). For VVOB, quality education implies ensuring equal opportunities for learners to become economically productive, develop sustainable livelihoods, contribute to peaceful and democratic societies, and enhance individual wellbeing.

To realize these objectives, VVOB focuses on capacity development of its operational partners: ministries of education, teacher training institutions and organizations focusing on professional development. Partners range from national and regional governments to institutions, individual schools, school leaders, teachers, and students. VVOB aligns its interventions with the local education policy and developing education expertise based on strong partnerships.

VVOB Rwanda, in partnership with Rwanda Basic Education Board (REB) and the Rwanda Coding Academy (RCA) is piloting a project to be implemented in 2 years in Kayonza district with the financial support of the Belgian Government through ENABEL. The aim of the Scratc²h 2050 pilot project is to equip at least 135 ICT and STEM teachers of approximately 45 secondary schools in Kayonza district with the competences needed to initiate and facilitate after school Scratc²h 2050 coding clubs for secondary school learners and to integrate Scratch into ICT and STEM lesson plans. To this end, VVOB will train secondary school STEM and ICT teachers on coding and its benefits through blended learning. After training, they will continue to develop professionally through participation in ongoing online and biannual face-to-face ScratchEd Meetups supported by RCA.

The project is built around four pillars:

5. Development of a Scratc²h 2050 pedagogical guide, complemented by ICT and STEM lesson plans and Open Education Resources (OERs)
6. Continuous Professional Development (CPD) trajectory for ICT and STEM teachers
7. Professional learning communities of ICT and STEM teachers
8. Establishment of after school Scratc²h 2050 coding club

In the framework of Scratc²h 2050, learners' digital journey will start in the classroom as STEM and ICT teachers integrate Scratch in STEM and ICT courses, triggering their interest. The coding clubs then provide the opportunity to truly develop digital skills in an enjoyable environment, combining fun with learning the programming language. Once learners know the basics of Scratch, the learning curve continues to go up: soon, learners will be able to digitally recreate a board game they played or create stories using their own storyline and characters. Gaining digital fluency, they will become part of a vibrant online community, where they can exchange ideas and materials, chat and continue to design and create their own projects.

It is expected that each trained teacher will initiate and facilitate 3 clubs, one per trimester, each consisting of 10 learners. In total, the project expects to support 4,050 secondary school learners through coding clubs and develop and strengthen the digital, creative and problem-solving skills of approximately 14,750 learners, particularly girls.

In order to evidence the extent to which teachers have the necessary competences to facilitate successful Scratc²h 2050 clubs and integrate Scratch in the classroom, a baseline Knowledge, Attitude and Practices (KAP) survey was carried out in April-May 2021 prior to the start of the digital literacy training and Scratch coding training for teachers. The baseline was carried out with 160 STEM and ICT teachers from 52 secondary schools that were selected to participate in the pilot project in Kayonza District. The baseline design is intended to complement the VVOB Needs Assessment conducted in December 2020 to determine external factors that may influence the project outcomes, including school leadership support for clubs and use of digital technology. In addition, the findings will be used to set the baseline figures for relevant indicators as per the project logical framework.

Methodology

Study Design

The Knowledge, Attitudes and Practices (KAP) survey will be carried out at baseline and endline with STEM and ICT secondary school teachers selected to participate in the pilot project. A KAP survey is meant to be a representative survey of the target population and aims to elicit what is known (knowledge), believed (attitude), and done (practiced) in the context of the topic of interest. These surveys have been adapted for use in the education setting to assess teacher knowledge, attitudes, practices and beliefs associated with various educational pedagogies. As there may be gaps between reported and actual practices, at endline, the KAP survey will be combined with qualitative research to verify and further explore findings from the KAP survey, including interviews with a sub-sample of teachers, sector education inspectors (SEIs), RCA staff, REB and VVOB to further explore factors associated with uptake in practices and develop recommendations for project scale-up.

In order to assess the extent to which teachers are able to initiate and facilitate afterschool coding clubs and integrate Scratch into the STEM/ICT lesson plans, there is a need to further explore the factors associated with a teacher's ability to adopt the practices. Bandura (Bandura, 1986) believes that behavior (or practice) can be more effectively predicted by a belief in capabilities, or self-efficacy, than what they are actually able to accomplish. This self-efficacy can be further defined as teacher "judgement of his or her capabilities to bring about desired outcomes of student engagement and learning" (Tschannen-Moran & Hoy, 2001). Teachers with high self-efficacy are more likely to experiment with methods of instruction, seek improved teaching methods and experiment with instructional materials (Allinder, 1994) (Guskey, 1988) (Wang & Stein , 1988). Efficacy beliefs also influence a teacher's persistence and resilience when things do not go smoothly (Webb & Ashton , 1986).

Another significant determinant of one's behaviors or practices are an individual's attitude toward the topic (Fishbein & Ajzen, 1969) as well as the background characteristics of the individual, including experiences, education training and environment (Xie, Talin , & Sharif, 2014) (Wilkins, 2008). In order to fully understand a teacher's technology integration practices, it is important to understand both the resources that they possess (or enabling environment), but also how and why they use these resources (attitudes) (Ertmer, Ottenbreit-Leftwich, & Tondeur, 2016).

The model in Figure 1 reflects the importance of environmental factors, especially the teacher's background, school environment, and school leadership support, on a teacher's ability to have the capacity (including knowledge, belief in self-efficacy and attitude) to facilitate Scratc²h 2050 clubs and integrate Scratch in the classroom. The model also reflects the continued learning and problem solving expected during the implementation of the Scratc²h 2050 project through on-going engagement with students during the practice of facilitating clubs and integration of Scratch in the classroom.

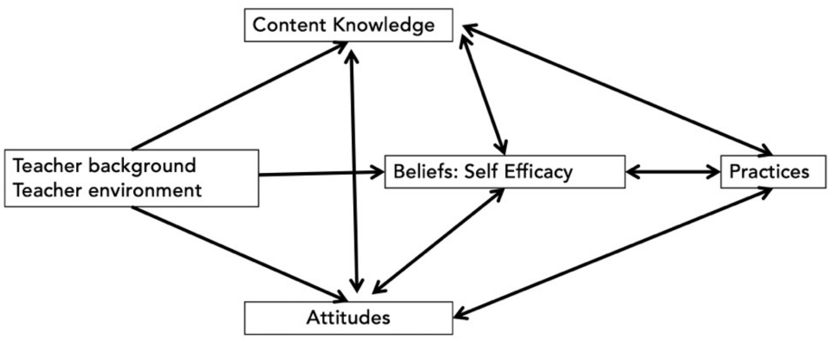

Figure 1: Study Design Model

The KAP survey was designed to capture the following at baseline for comparison with endline data collected at project completion:

KNOWLEDGE: Teacher knowledge of both digital literacy and Scratch coding (as per the VVOB Scratc²h 2050 Pedagogical Guide). As it is not possible to objectively measure digital literacy in this context, the digital literacy knowledge component is based on the UNESCO's Global Framework for Digital Literacy Skills (UNESCO, 2018) and the European Commission's SELFIE tool (European Commission). Therefore, the digital literacy component is a self-assessment of knowledge.

ATTITUDES: Teacher attitudes regarding the perceived benefits of Scratch clubs for learners and personal enjoyment of using Scratch.

BELIEFS OR SELF EFFICACY: Teacher's beliefs in their ability to use Scratch, lead Scratc²h 2050 coding clubs, and integrate Scratch in the classroom.

PRACTICES: Practices explore existing teacher practices, including leading Scratch clubs (as per the VVOB Scratc²h 2050 Pedagogical Guide) and extent to which teachers report that they are incorporating Scratch into the STEM/ICT curriculum.

TEACHER ENVIRONMENT: The framework recognizes that there are external factors that may influence the knowledge, attitudes, beliefs and practices of teachers including the extent to which the school environment supports use of ICT, both in terms of school ICT infrastructure and capacity as well as school leadership support for use of digital technology and Scratch in the classroom (based on the SELFIE tool) and leadership support for clubs. The school demographics may also influence the environment, including school location, status, type and academic designation.

TEACHER DEMOGRAPHICS: Finally, the KAP survey will assess the extent to which teacher demographics, including education background, number of years teaching, age and gender influence teacher knowledge, attitudes and practices to initiate and facilitate clubs and integrate Scratch into the STEM/ICT curriculum.

The KAP survey will also provide baseline and endline values to respond to the following indicators as per the project's logical framework (See Table 1):

1. Percentage of trained teachers who have achieved at least minimum level of proficiency across digital literacy skills, as proposed in the Digital Literacy Global Framework
2. Percentage and number of trained teachers who have achieved a high proficiency in terms of content creation (coding),
3. Percentage and number of trained teachers who report to feel competent to facilitate after school Scratc²h coding clubs, and
4. Percentage and number of trained teachers who report to feel competent to integrate Scratch into STEM/ICT lesson plans.

Data Collection Approach

The KAP survey was translated from English into Kinyarwanda and both versions were loaded into KoboCollect. The link to the KAP survey was shared with a sample of secondary school teachers identified by VVOB for piloting. The link to the revised survey was then shared with all enrolled teachers prior to their participation in the digital literacy course (for those who have not taken the course as a requirement of participation in the LTLT certificate course) or the Scratch course. Teachers had the option to take the survey in the language of their choice (either English or Kinyarwanda). To note, schools in Kayonza district report to have three science teachers per school, one trained in ICT and two in STEM. Schools were responsible to select the teachers and wherever possible, at least one female teacher was selected. However, this was not always possible in every school.

Data Analysis

The analysis is divided into 6 broad categories: teacher background, teacher environment, content knowledge, attitudes, self-efficacy and practices. These categories are distributed across 4 main topics including Digital Literacy, Scratch, School Clubs and Scratch/ Coding in the Classroom. For each category and topic, an assessment score was calculated to use as a reference for assessing change between KAP at baseline and endline. For the endline research, the progress in digital literacy digital literacy and Scratch coding after training has been conducted will be assessed by comparing the results from individual teachers during the baseline research with their answers to the endline research. Two separate analyses will be conducted on the final KAP survey. First, the analysis will provide responses to each question and then compare changes for the combined variables between baseline and endline. Second, a regression model will be developed to illustrate the relationships between different variables and teacher likelihood of leading a Scratch coding club and integrating Scratch in the STEM/ICT curriculum.

Table 3: Categories of Data

1	Teacher Background	• Age • Gender • Teaching experience
2	Teacher Environment	• School factors (location, school type/designation, etc.) • ICT enabling environment (school leadership support, availability of equipment, technical support) • Club enabling environment (school leadership support, etc.)
3	Content Knowledge	• Digital literacy • Scratch
4	Attitudes	• Importance of Scratch/coding • Enjoyment of Scratch/coding
5	Self-Efficacy	• Use/Learn Scratch • Lead coding clubs • Integrate Scratch/coding into the STEM/ICT curriculum
6	Practices	• Current involvement in clubs • Extent to which teachers are incorporating Scratch/Coding into the curriculum

To improve the stability and accuracy of the questions in the survey, questions were combined to present a score for each section. Correlation analysis was conducted to determine the consistency of questions within a topic. After removing any unrelated questions, the scores per topic were summed.

Based on the outcome of the questions, a metric was defined for each of the outcome indicators of the research to be able to compare the final progress made with teachers' skill at baseline as per the project logical framework.

Findings: Project Indicators

Baseline KAP findings were used to calculate the project indicators as per the Scratch Logical Framework.

Table 4: VVOB Scratc^{2}h Logical Framework

Intervention Logic	Objectively Verifiable Indicators	Sources and Means of Verification	Assumptions
General Objective			
To support the upscaling or replication of initiatives that close the digital divide for vulnerable groups (youth, women, unemployed, refugees and migrants) by improving digital literacy and skills through D4D initiatives in education, training, and the world of work	Percentage of vulnerable groups who have achieved at least a minimum level of proficiency in digital literacy skills, as proposed in the Digital Literacy Global Framework	Questionnaire: In the absence of any local measure to assess digital literacy, VVOB will adapt its own digital literacy assessment that was developed previously and expand it to include coding competencies informed by the EU's SELFIE questionnaire. Each term, trained teachers will conduct the questionnaire among learners.	* Computer labs are functional; * School leaders support STEM and ICT teachers to integrate Scratch in their classes (e.g. enabling use of computer labs).
Specific Objective			
Equip 135 ICT & STEM teachers of 45 secondary schools in Kayonza district with the competences needed to initiate and facilitate after school Scratc2h 2050 coding clubs for secondary school learners and to integrate Scratch into STEM/ICT lesson plans.	* Percentage of trained teachers who have achieved at least minimum level of proficiency across digital literacy skills, as proposed in the Digital Literacy Global Framework, and high proficiency in terms of digital content creation (coding).	* Pre- and post-training Knowledge-Attitude-Practice (KAP) survey based on VVOB's digital literacy assessment and complemented by EU's SELFIE questionnaire	External conditions: * REB endorses the Scratc2h 2050 pedagogical guide and blended learning trajectory; * RCA trainers are available to facilitate trainings. Risks: * Theft of or damage to tablets hinders teachers' participation in learning trajectory; * Instable internet connection hinders teachers' participation in online sessions.
	* Percentage of trained teachers who report to feel competent to facilitate after school Scratc2h 2050 coding clubs.	* Pre- and post-training Knowledge-Attitude-Practice (KAP) survey based on VVOB's digital literacy assessment and complemented by EU's SELFIE questionnaire	
	* Percentage of trained teachers who report to feel competent to integrate scratch into STEM/ICT lessons plans	* Pre- and post-training Knowledge-Attitude-Practice (KAP) survey based on VVOB's digital literacy assessment and complemented by EU's SELFIE questionnaire	
	* % interviewed teachers that mention Scratch as a Most Significant Change (MSC) story.	* Interviews using MSC theory	
Expected Results			
1. Development & design of Scratc2h 2050 pedagogical guide	1.1. Endorsement by REB of Scratc2h 2050 pedagogical guide.	* Endorsement report	External conditions: * Internet connection required to view OERs. * Teachers have time to participate in Scratc2h 2050 blended learning trajectory. * Teachers are willing to integrate Scratch in STEM/Computer Science classes. * Sufficient ICT infrastructure is available to host Scratc2h 2050 coding clubs.
	1.2. N° of views of 10 Open Education Resources (OERs) on teaching and learning coding & programming with Scratch in Rwandan context.	* OERs clicks, views & shares	
2. Development and implementation of Scratc2h 2050 blended learning trajectory (including 2 F2F sessions, 3 online learning sessions, ScratchEd Community Platform & ScratchEd Meetups)	2. Teacher attendance rate in (1) Face-to-Face (F2F) sessions, (2) in online sessions, (3) in biannual ScratchEd Meetups; and participation on ScratchEd Community Platform.	* Attendance registers	
3. 135 after school Scratc2h coding clubs are running in 45 schools in Kayonza district	3.1. N° of learners (F:M) participating in Scratch coding clubs.	* Club registries * Club visits by SEIs	
	3.2. N° Scratch stories, games and animations created by learners in Kayonza.	* Scratch clips produced	
	3.3. % interviewed learners that mention Scratch as a Most Significant Change (MSC) story.	* Interviews using MSC theory	

Indicator 1: Minimum level of proficiency in digital literacy skills

In order to measure the *percentage and number of teachers who have achieved at least a minimum level of proficiency in digital literacy skills as proposed in the Digital Literacy Global Framework*, a series of questions on digital literacy skills were asked to teachers. The digital literacy assessment was designed in line with the

UNESCO's Global Framework for Digital Literacy Skills (UNESCO, 2018) and VVOB's existing digital literacy assessment. The assessment measured five competencies:

- Competency 0: Devices and Software Operation
  - Competency 0.1: Device Operations
  - Competency 0.2 Software Operations
- Competency 1: Information and Data Literacy
- Competency 2: Communication and Collaboration
- Competency 4: Safety
- Competency 6: Career Related Competences

Minimum competency was set at 60% for digital literacy skills based on Bloom's Cut Off Points[1]. At the time of assessment, 63% of teachers surveyed met the minimum competency. This was higher for male teachers (65%) as compared to female teachers (57%).

Table 5: Indicator 1: Minimum level of Proficiency in Digital Literacy Skills

Indicator	Total	Female	Male
Percentage and number of vulnerable groups who have achieved at least a minimum level of proficiency in digital literacy skills as proposed in the Digital Literacy Global Framework (TEACHERS).	63% (101/160)	57% (21/37)	65% (80/123)

Currently 38% of teachers meet a high level of proficiency, as defined as a score of 80% or higher on the digital literacy assessment, which is higher for male teachers (43%) as compared to female teachers (19%).

Table 6: Teachers Meeting High Proficiency (80-100%) in Digital Literacy Skills

Teachers meeting high proficiency (80-100%) in digital literacy	Total	Female	Male
Percentage and number of vulnerable groups who have achieved at least a high level of proficiency in digital literacy skills as proposed in the Digital Literacy Global Framework (TEACHERS).	38% (60/160)	19% (7/37)	43% (53/123)

Indicator 2: High proficiency in content creation (coding)

To determine the *Percentage and number of trained teachers who have achieved a high proficiency in terms of content creation (coding*), a Scratch assessment was developed and administered to teachers. The assessment covered both computation concepts and computational practices. Computational practices assessed teacher's understanding of the use of Scratch through multiple choice questions to test expected competences as per the modules in the Scratc[2]h curriculum, including:

- Module 1: Scratch Interface Elements and Using Math Operator Blocks
- Module 2: Motion and Direction in XY Coordinates
- Modules 3 and 4: Story Creation and Animation in Scratch
- Module 5: Polygons and Flowers
- Modules 6 and 7: Games

High proficiency in content creation or coding with Scratch was set at 80%. Only one teacher met the requirement for high proficiency (or 0.6%) out of all teachers surveyed.

Table 7: Indicator 2: High Proficiency in Content Creation (Coding)

Indicator	Total	Female	Male
Percentage and number of trained teachers who have achieved a high proficiency in terms of content creation (coding).	0.6% (1/160)	0% (0/37)	0.8% (1/123)

[1] Blooms Cut Off Points: High Proficiency: 80 – 100%; Minimum Proficiency 60 – 100%.

The same teacher noted above is the only teacher also currently meet the minimum proficiency in content creation or coding with Scratch (or those scoring 60% or higher on the assessment) for a total of 0.6% of respondents.

Table 8: Teachers Meeting Minimum Proficiency (60-100%) in Content Creation

Teachers meeting minimum proficiency (60-100%) in content creation	Total	Female	Male
Percentage and number of trained teachers who have achieved a minimum proficiency in terms of content creation (coding).	0.6% (1/160)	0% (0/37)	0.8% (1/123)

Indicator 3: Competency to facilitate after-school Scratc^{2}h coding clubs

The percentage and number of trained teachers who report to feel competent to facilitate after school Scratc^{2}h coding clubs was measured as those teachers reporting to feel moderately and completely confident in their ability to lead a Scratch club at their school. In total, 28% of teachers feel confident in their ability to lead a Scratc^{2}h coding club, which is higher for male teachers (31%) as compared to female teachers (19%). Only 18% of teachers were completely confident in their ability to lead a club (5% of female and 21% of male teachers).

Table 9: Indicator 3: Competency to Facilitate After-School Scratc^{2}h Coding Clubs

Indicator	Total	Female	Male
Percentage and number of trained teachers who report to feel competent to facilitate after school Scratc^{2}h coding clubs.	28% (45/160)	19% (7/37)	31% (38/123)

Indicator 4: Competency to integrate Scratch into STEM/ICT lesson plans

Percentage and number of trained teachers who report to feel competent to integrate Scratch into STEM/ICT lesson plans was assessed by asking teachers to what extent they agree with the following statement "I have the skills to incorporate Scratch into my lesson plans". Those that agreed or strongly agreed with the statement were included as those who feel competent to integrate Scratch. Overall, 22% of teachers reported that they can integrate Scratch into lesson plans, 19% of females and 23% of males.

Table 10: Indicator 4: Competency to Integrate Scratch into STEM/ ICT Lesson Plans

Indicator	Total	Female	Male
Percentage and number of trained teachers who report to feel competent to integrate Scratch into STEM/ICT lesson plans.	22% (35/160)	19% (7/37)	23% (28/123)

Findings

Section 1: Teacher Background/ Demographics

School Type

In total STEM and ICT secondary school teachers selected to participate in the pilot project from 52 secondary schools in Kayonza district were included in the survey. Of these schools, 17 (33%) were 9 Year Basic Education (YBE) schools, 25 (48%) were 12YBE schools and 10 (19%) were secondary only schools. The majority of 9YBE (71%) and 12YBE (56%) schools are public schools while secondary only schools are primarily private (60%). In all, 56% of secondary schools in Kayonza are public, 33% are government aided and 12% are private schools.

Table 11: Schools by Designation and Status

School Status/ Designation	9YBE	12YBE	Secondary only	Total	% of Total
Public	12	14	3	29	55.8%
Government Aided	5	11	1	17	32.7%
Private	0	0	6	6	11.5%
Total	17	25	10	52	
% of Total	32.7%	48.1%	19.2%		

Teacher Gender and Age

Teachers identified for participation in the Scratc²h 2050 project are primarily male (70% or 123 out of 160) as compared to female (30% or 37 out of 160). The average age of teachers is 32.7 years (32.9 for females and 32.7 for males), with the minimum age reported for teachers being 23 years while the maximum age is 51 years (45 female, 51 male). Only 8% of respondents are 40 and above (11% of females and 7% of males) and only one person surveyed (0.06% of respondents) is over the age of 50.

For analysis purposes, age has been categorized into three categories. Initial analysis showed consistent differences in responses of those under the age of 30 and over the age of 35. Coincidentally, the breakdown of respondents under the age of 30 and over the age of 35 are the same for both females and males respectively (see Table 12).

Table 12: Teachers by Gender and Age

Age Range	Total	% Total	Total Female	% Female	Total Male	% Male
<30	37	23.1%	10	27.0%	27	22.0%
30-35	86	53.8%	17	45.9%	69	56.1%
>35	37	23.1%	10	27.0%	27	22.0%
Total	160		37	23.1%	123	76.9%

There was little difference in proportion of male and female teachers by school status, with 54% of female and male teachers teaching in public schools, 35% of female and 33% of male teachers in government-aided and 11% of females and 12% of males in private schools. In addition, there is little difference in gender representation by school type with 84% of females and 81% of males surveyed from day-schools and 16% of females and 19% of males from boarding schools. However, there is a greater proportion of male teachers at secondary only schools as compared to female teachers.

Teacher Education Levels

Over half of teachers surveyed (52%) have attained a bachelor's degree. Female teachers are more likely to have a bachelor's degree or higher (73%) as compared to their male counterparts (58%). However, only 9% of teachers have obtained a master's degree or a post-graduate degree. Here too, female teachers are more likely than male teachers to have a post-graduate diploma in education (16% for female and 6% for male teachers).

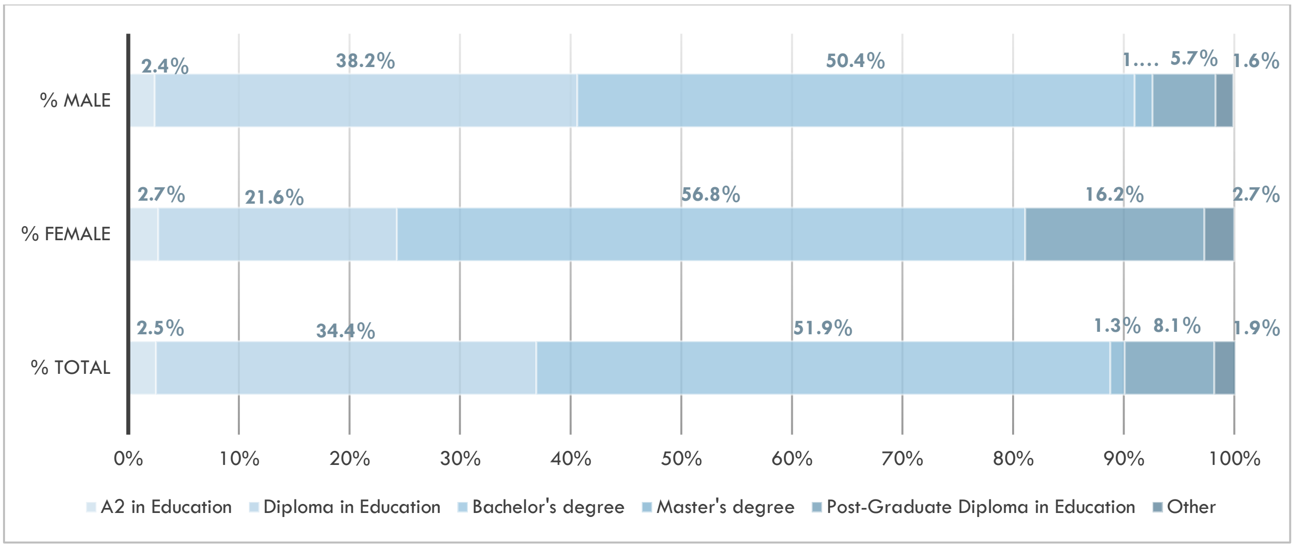

Figure 2: Teacher Education by Gender

Teachers surveyed from private and government aided schools had higher education levels as compared to teachers in public schools, with 64% of private school teachers and 70% of government aided school teachers holding a bachelor's degree or higher, as compared to 53% of public school teachers. Public school teachers were more likely to hold an A2 or diploma in education (46%). No private school teachers reported holding an A2 in education.

Teaching Subject Matter

The two most reported subject taught by teachers included in the Scratc²h 2050 project are mathematics (37%) and ICT (36%). Of the teachers surveyed, 50% reported teaching more than one subject (57% of female and 48% of male teachers). The average number of subjects taught is 1.44, with female teachers averaging 1.41 and male teachers averaging 1.45. Teachers who teach more than one subject are more likely to teach chemistry and biology (21% of teachers teaching more than one subject, or 11% of all teachers surveyed); physics and mathematics (19% of teachers teaching more than one subject, or 9% of all teachers surveyed); or mathematics and ICT (16% of teachers teaching more than one subject, or 8% of all teachers surveyed). Overall, female teachers have greater representation in biology and chemistry and less representation in physics, math and ICT.

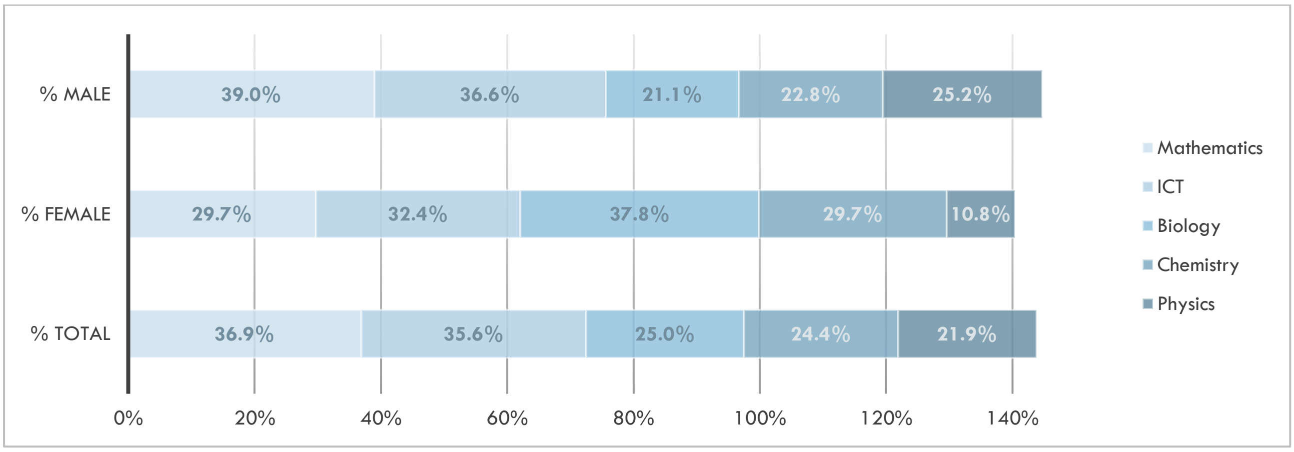

Figure 3: Teaching Subjects by Gender

Teaching Experience

On average, teachers have 4.2 years of teaching experience at their current school, or 3.6 years for females and 4.3 years for males. Female teachers were more likely to report being at their current school for less than two years (54%) as compared to their male colleagues (37%). Teachers at private schools are more likely to have more teaching experience at their current school with 53% reporting 6 or more years of teaching experience, whereas 33% of government aided and 26% public school teachers have been teaching at their school for 6 or more years. Public school teachers were also more likely to report being at their current schools for less than two years (44%) as compared to their government aided (39%) and private school (37%) colleagues.

When looking at overall teaching experience, teachers have an average of 5.9 years of teaching (6.3 years for females and 5.8 years for males) experience. While female teachers have less teaching experience at their current school, they have more years teaching on average as compared to their male colleagues who were surveyed. Teachers at government aided schools have more teaching experience overall (58% reporting 6 or more years) while 53% of private school teachers and 45% of public-school teachers have 6 or more years' experience. This may indicate that government aided and public-school teachers are more likely to change schools throughout their careers as compared to private school teachers.

Participation in the UR-CE-VVOB Certificate Course on Mentorship and Coaching

Out of the surveyed teachers 35% (56 out of 160) reported having participated in the UR-CE/VVOB CPD (Continuous Professional Development) Certificate course on Mentorship and Coaching. There was a significant gender difference in the percentage of male teachers who participated. While 40% of male teachers reported participation in the CPD Certificate Course, only 19% of females reported participation. Of those, reporting participation in the course, 24 (or 43%) participated in either the fully online or blended learning course and it would be expected that they have achieved the minimum digital literacy skills.

Table 13: Participation in the UR-CE / VVOB Course on Mentorship and Coaching

CPD Program	Total	% Total	Total Female	% Female	Total Male	% Male
In-person course	32	20.0%	4	10.8%	28	22.8%
Online course	10	6.3%	1	2.7%	9	7.3%
Blended course	14	8.8%	2	5.4%	12	9.8%
No	102	63.8%	29	78.4%	73	59.3%
Don't know	2	1.3%	1	2.7%	1	0.8%
Total	160		37		123	

Looking at individual schools, the majority of schools, 69% have at least one teacher surveyed who participated in the course. However, only 50% of private schools have at least one teacher surveyed who participated in the course, whereas 69% of public schools and 76.5% of government aided schools have at least one teacher surveyed who participated.

Section 2: Digital Literacy

Section 2. A. Enabling School Environment: Digital Learning

In order to assess if the school environment could be considered favourable for digital learning, a school environment index score was calculated for each teacher based on both physical factors, such as availability of electricity and computers, as well as school leadership support for digital literacy. On average, teachers surveyed scored 15.9 out of 40, with female teachers scoring 12.9 and male teachers 16.8. Overall, female teachers reported much lower scores on the enabling school environment index as compared to their male colleagues, with 49% of female teachers scoring between 0-9 out of 36 as compared to 30% of male teachers. Findings also show that ICT (17.2 average score) and physics (17.9 average score) teachers were more likely to report an enabling environment. Private school teachers (25.7 average score) were much more likely to report an enabling school environment as compared to their colleagues, reflecting better access to resources.

Physical Environment

The physical environment may pose some challenges to the clubs and ability of teachers to incorporate digital technologies in the classroom. While 58% of teachers report that their school always has electricity, 25% of teachers note that their school never has electricity. In addition, while 39% of teachers surveyed report that their school always or often have computers available for student use, 38% report that their school never have computers available for student use. An equal number of teachers state that they do have access to digital devices (36%) as teachers who report not having access to devices (36%). Furthermore, more than half of teachers (56%) surveyed report that their schools never have access to assistive devices for students with special needs.

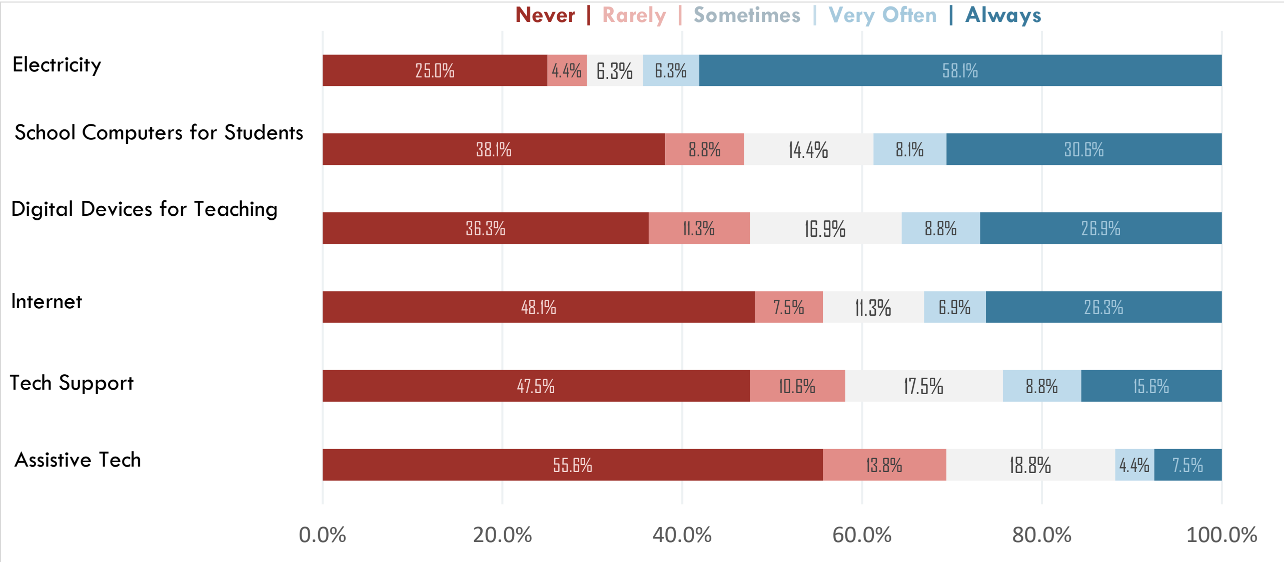

Figure 4: School Environment: Physical Environment Access Factors

Only 44% of teachers reported that their school has Smart Classrooms, with 18% of all teachers surveyed noting that these are sufficient. The greatest percentage of teachers (33%) reported that they had 10 computers or less in their school and 19% of teachers surveyed reported having no computers at all. Private school teachers were more likely to report that their school had more than 10 computers (58%) with 26% reporting more than 100 computers. Similarly, 51% of teachers from public schools reported 10 or more computers and 28% reporting more than 100. Government aided schoolteachers were least likely to report having more than 10 computers (43%) or more than 100 (24%).

School Leadership Support

School leadership support was assessed through survey questions on if teachers feel supported to try new things, discuss CPD needs for digital technologies and share experiences. Overall, teachers felt more supported to share experiences of use of digital technologies, with 36% of teachers reporting that this always or very often occurs, particularly in government aided schools (44%) and less so in private schools (26%). Similarly, teachers in government aided schools were more likely to report that they always or very often feel supported by their school leaders to try new things (33%) as compared to teachers in public (29%) and private (26%) schools. However, private school teachers were more likely to report that school leaders support them to discuss CPD needs for use of digital technology (32%) as compared to the government aided (28%) and public (30%) schoolteachers.

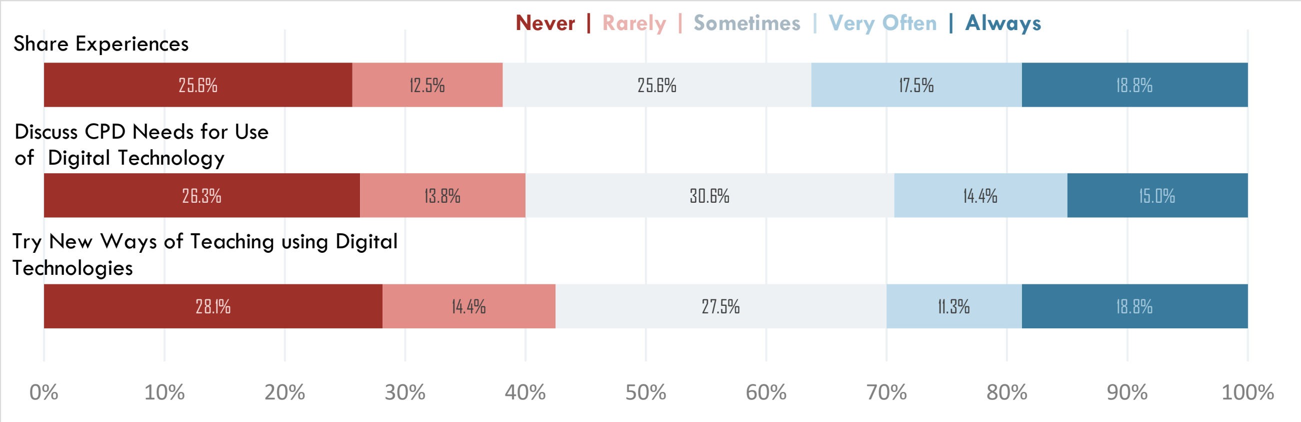

Figure 5: School Leadership Support for Teachers for use of Digital Technologies

CPD for Digital Technology Skills Development

The majority of teachers have attended one or more CPD Courses on the Pedagogical Use of Digital Technologies. Only 18 (11%) of teachers surveyed reported not attending any CPD programs on the use of digital technology. By comparison, 81 (51%) of teachers surveyed reported attending 1 CPD program, and 142 (89%) of teachers attended one or more CPD program on the use of digital technologies.

The greatest percentage (43%) of teachers reported attending in-person courses or seminars, followed by (36%) formal school-based mentoring or coaching. Learning from other colleagues, as well as online courses, webinars or conferences were highly reported methods of attending CPD courses (both at 25%). Few teaches reported attending accredited courses or degree programs (6%) or study visits to other schools (8%).

While both female and male teachers equally reported participation in CPD activities, male teachers were more likely to report participation in 2 or more activities (41%) as compared to females (30%).

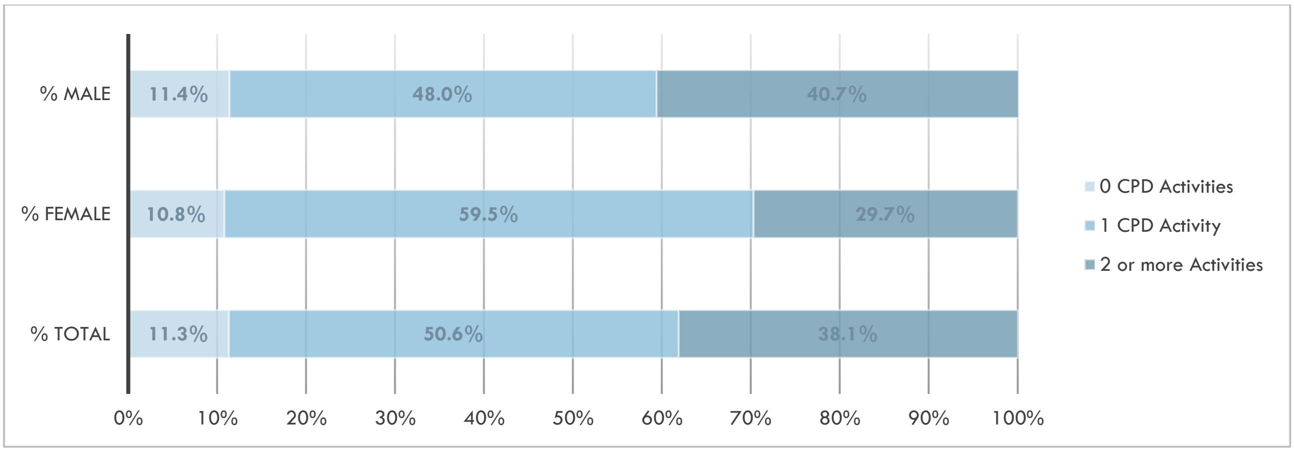

Figure 6: Gender and Participation in CPD

In addition, public school teachers were more likely to report having participated in one CPD activity (53%), but less likely to report participating in 2 or more CPD activities (35%) as compared to teachers from government aided schools (41%) or private schools (47%).

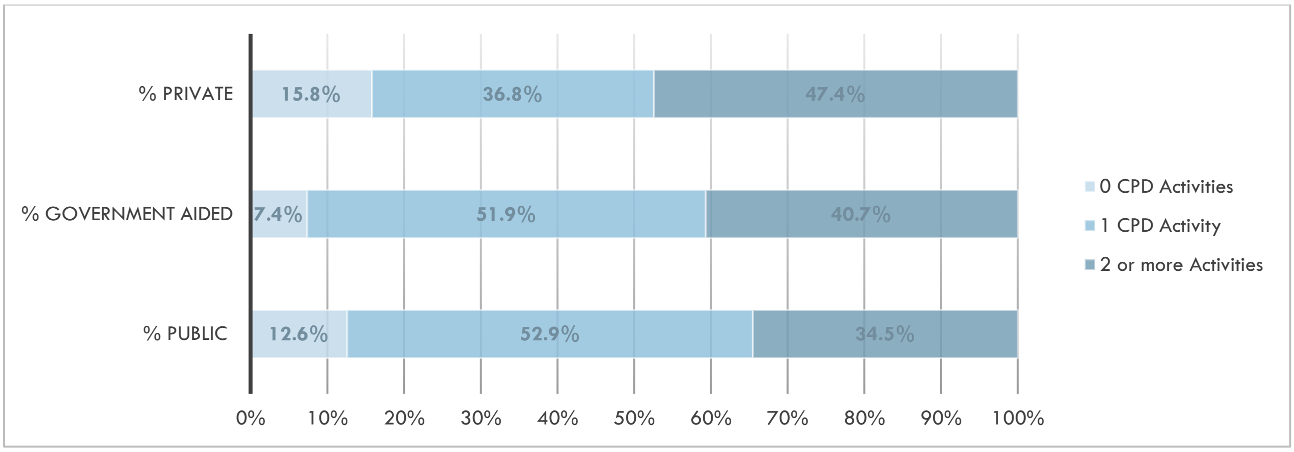

Figure 7: School Status and CPD Participation

Section 2. B. Digital Literacy Assessment

The digital literacy assessment was designed in line with the UNESCO's Global Framework for Digital Literacy Skills (UNESCO, 2018) and VVOB's existing digital literacy assessment. The assessment measured five competencies:

1. Competency 0: Devices and Software Operation
    a. Competency 0.1: Device Operations
    b. Competency 0.2 Software Operations
2. Competency 1: Information and Data Literacy
3. Competency 2: Communication and Collaboration
4. Competency 4: Safety
5. Competency 6: Career Related Competences

Competences 3 and 6 (Digital Content Creation and Problem Solving) are assessed under the Scratch Assessment (See Section 3.A).

Scores are presented by competency and as an overall Digital Literacy score.

Digital Literacy Assessment

The average score for all teachers on the digital literacy assessment was 67 out of 100, while female teachers averaged 61 and male teachers averaged 69. Younger teachers also performed better on the assessment with those under the age of 30 scoring an average of 82.3 as compared to teachers between the ages of 30 and 35 (63.6) and those above the age 35 (58.6). ICT teachers performed better on the assessment (79.3 average score) as compared to teachers of other subjects (64.6 average score for math teachers and 67.3 for physics teachers). In addition, scores for private school teachers were higher on average (76.6) as compared to teachers from government aided (67.3) and public schools (64.3).

Over half (53%) of those surveyed (84 out of 160) scored 70% or higher on the digital literacy assessment. Only 32% of female teachers (12 out of 37) scored 70% or higher, while 59% of male teachers (73 out of 123) scored 70% or higher. Nearly three quarters, or 72% of all teachers (115 out of 160), scored 50% or higher on the digital literacy assessment. Broken down by gender, 65% of female teachers (24 out of 37) and 74% of male teachers (91 out of 123) scored 50% or higher on the assessment.

Teachers that participated in the fully online UR-CE/VVOB Certificate Course were more likely to score 70% or higher on the assessment (90% of teachers) as compared to those who either did not participate in the course or only participated in the in-person course (50%). Those teachers that participated in the blended learning course did not perform better than those who did not participate in the course as only one lesson was online (with 43%

scoring 70% or higher) and teachers were not required to participate in the digital literacy course in advance of the program.

Digital Literacy Assessment Index Score by Competency

Digital literacy competency across ages and genders varied by specific competency but averaged 2.7 out of 4 for all surveyed teachers. Competency 0.1: Devices Operations had the highest averages (3.7 out of 4 and above) in all age groups and genders. The lowest overall scores for both gender and age were in Competency 4: Safety and Competency 5: Career Related Competencies. Of note, female teachers scored lower than their male colleagues in both Competency 1: Information and Data Literacy and Competency 2: Communication and Collaboration. Overall, teachers under the age of 30 scored the highest in all competencies, while older teachers >35 scored the lowest in all competencies.

Table 14: Digital Literacy Competency Scores by Gender and Age (score on 4 point scale)

Digital Literacy Assessment Average Score by Category (Out of 4)	Average Total Score	Gender		Age		
		Female	Male	<30	30-35	>35
Average Across All Competencies	2.7	2.5	2.8	3.0	2.4	2.2
Competency 0.1: Devices Operations	3.8	3.8	3.8	3.9	3.7	3.7
Competency 0.2: Software Operations	2.9	2.7	2.9	3.4	2.8	2.4
Competency 1: Information and Data Literacy	2.6	2.3	2.7	3.2	2.4	2.4
Competency 2: Communication and Collaboration	2.5	2.1	2.6	3.1	2.4	2.1
Competency 4: Safety	2.1	1.8	2.2	2.4	1.5	1.4
Competency 6: Career Related Competences	2.5	2.4	2.6	2.0	1.4	1.4

An analysis of teacher digital literacy competency based on school status shows that teachers from government schools had slightly higher averages across all competencies compared to public and private school teachers. Safety was again a primary place of low scoring across school status, and device operations resulted in the highest scores across school status.

Table 15: Digital Literacy Competency Scores by School Status (score on 4 point scale)

Digital Literacy Assessment Average Score by Category (Out of 4)	School Status		
	Public	Government Aided	Private
Average Across All Competencies	2.7	2.8	2.5
Competency 0.1: Devices Operations	3.7	3.8	3.9
Competency 0.2: Software Operations	2.9	2.9	2.9
Competency 1: Information and Data Literacy	2.7	2.6	2.4
Competency 2: Communication and Collaboration	2.4	2.6	2.4
Competency 4: Safety	2.2	2.2	1.6
Competency 6: Career Related Competences	2.6	2.6	2.0

Looking at digital literacy from a teacher's subject matter perspective, ICT and Physics teachers surveyed performed better than teachers from other subjects with scores of 3.2 and 2.4 respectively. Device Operations scored high again across all subject matters, while the lowest scores were found in Career Related Competencies.

Table 16: Digital Literacy Competency Scores by Subject (score on 4 point scale)

Digital Literacy Assessment Average Score by Category (Out of 4)	ICT	Physics	Biology	Mathematics	Chemistry
Average Across All Competencies	3.2	2.8	2.4	2.6	2.5
Competency 0.1: Devices Operations	3.9	3.8	3.8	3.7	3.7
Competency 0.2: Software Operations	3.4	2.8	2.5	2.8	2.7
Competency 1: Information and Data Literacy	3.2	2.7	2.1	2.5	2.4
Competency 2: Communication and Collaboration	3.0	2.5	2.0	2.5	2.1
Competency 6: Career Related Competences	2.8	2.2	1.6	2.0	1.7
Competency 4: Safety	2.9	2.6	2.3	2.3	2.3

Competency 0.2: Software Operations

Further breaking down specific competency categories, Competency 0.2: Software Operations was divided into four software categories; Internet, Word, Excel and PowerPoint. Surveyed teachers scored higher on Internet (3.2) and Word (3.0) and lower on Excel (2.5) and PowerPoint (2.3).

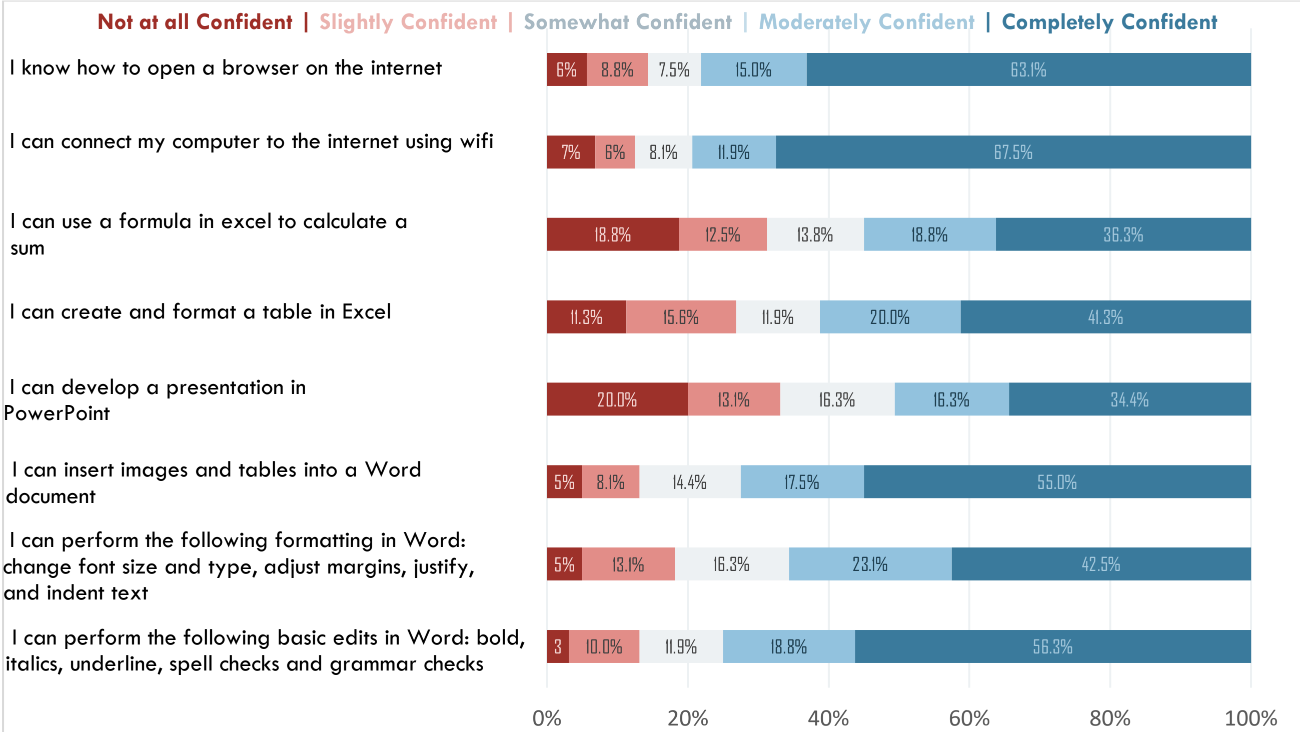

Figure 8: Competency 0.2: Software Operations

Competency 1: Information and Data Literacy

Survey respondents reported that, overall, they were more confident in using a search engine and finding information on the internet (76% reporting to be moderately to completely confident). The majority (63%) of teachers were also moderately to completely confident installing applications from the internet on their computer. Teachers expressed less confidence in being able to evaluate the quality and validity of the information they find from web-based resources (39%).

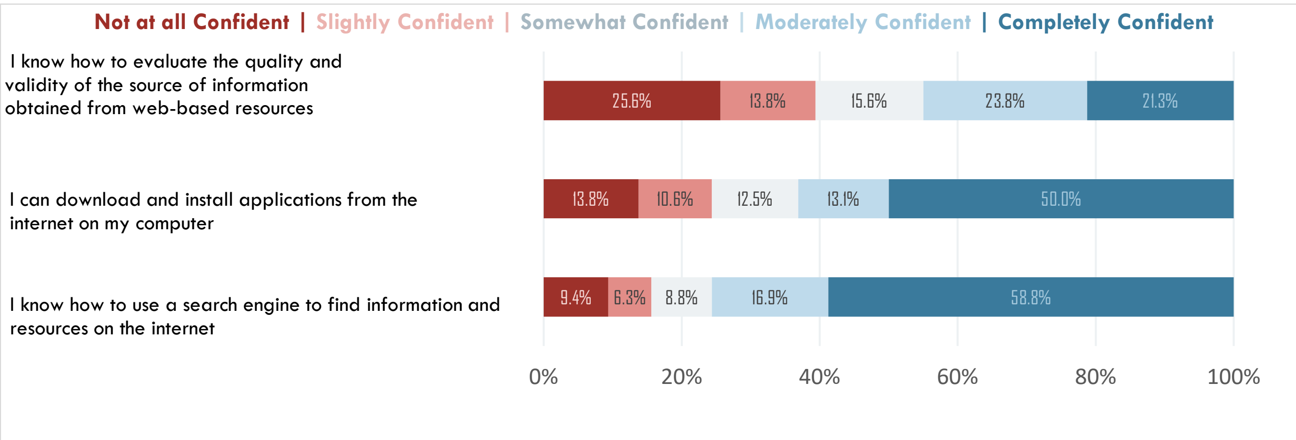

Figure 9: Competency 1: Information and Data Literacy

Competency 2: Communication and Collaboration

Competency 2: Communication and Collaboration was divided into use of E-mail and Moodle with teachers' scores for email being high (3.0) while their score for Moodle were low (1.7). Most teachers were moderately to completely confident in using email with 76% reporting that they can compose and email and 64% reporting confidence in using email for school-related communication. Teachers that reported participating in the UR-CE/VVOB Certificate course on Coaching and Mentorship were more likely to report being completely or moderately confident in replying to a message in the Moodle forum (57%) and uploading a document in Moodle (50%) as compared to the average (38% for both).

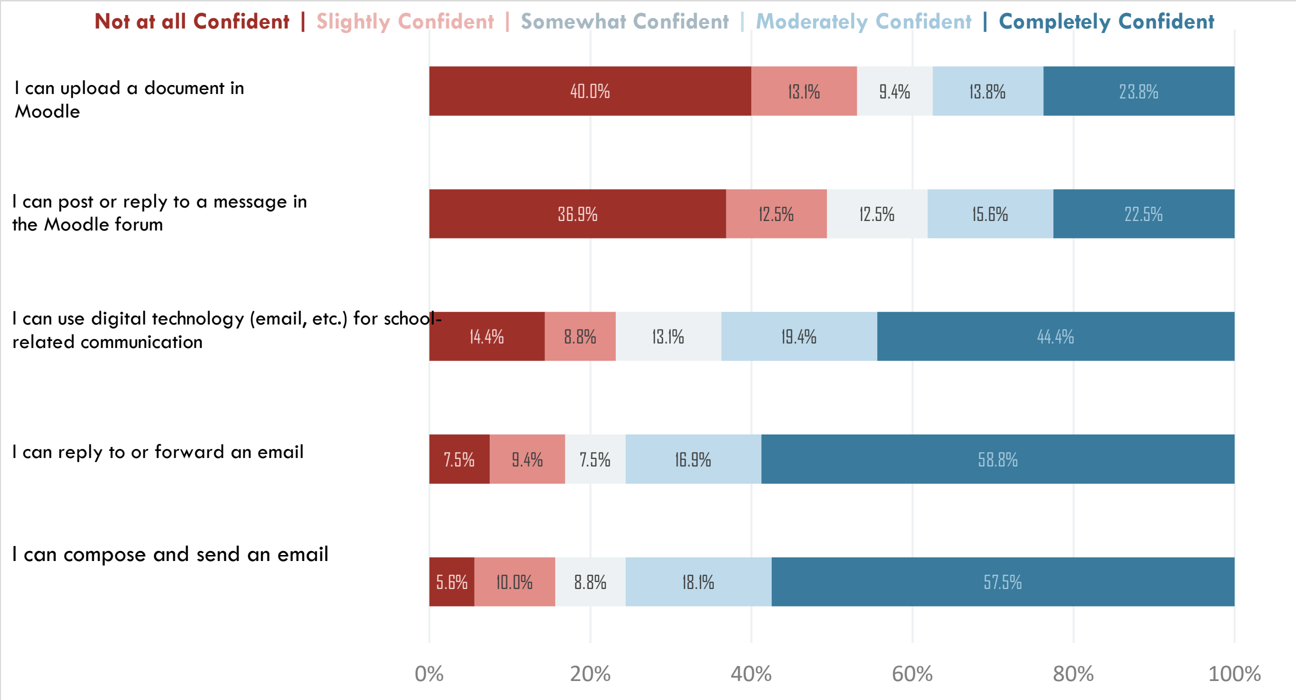

Figure 10: Competency 2: Communication and Collaboration

Competency 4: Safety

Based on survey results, teachers displayed a lack of confidence around safety, including how they can keep school related digital data secure (41%), how to ensure privacy of personal information (41%) and the ways to download and install anti-virus software programs (40%). Teachers expressed greater confidence in knowing when they should or should not share information while online with 53% reporting to be moderately to completely confident.

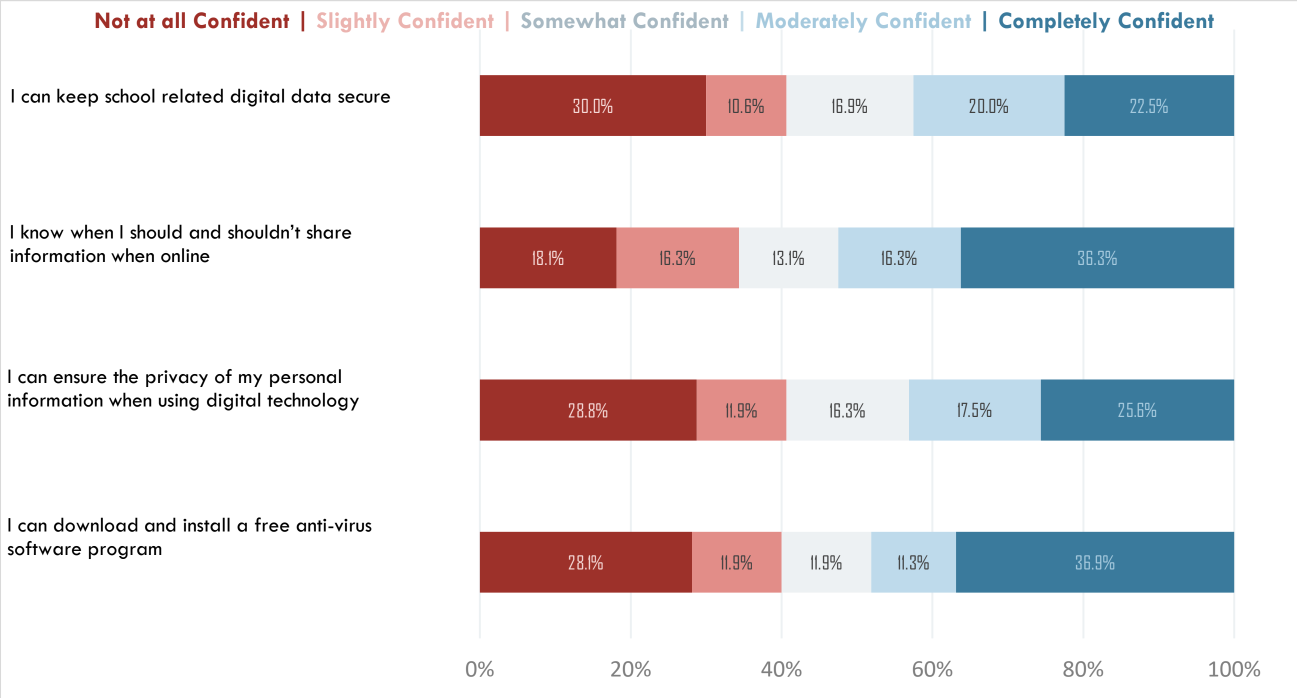

Figure 11: Competency 4: Safety

Competency 6: Career Related Competences

Surveyed teachers reported a greater ability to search online for digital resources (64% moderately to completely confident). In contrast, a higher number of respondents report that they had no confidence in using these resources to develop educational material for use in the classroom (29%).

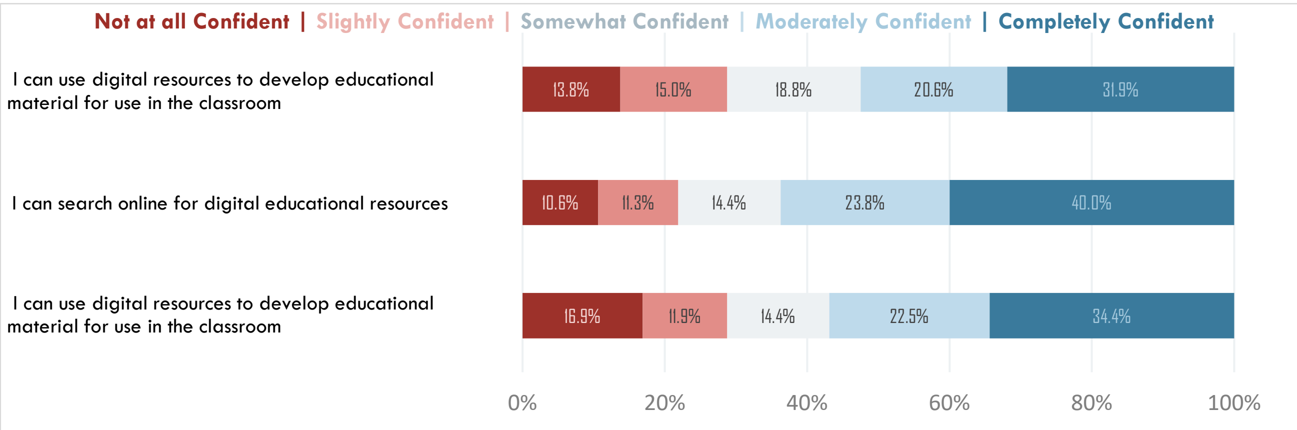

Figure 12: Competency 6: Career Related Competences

Section 3: Scratch

Section 3. A. Coding/ Scratch Competences

Based on survey results, over half (52%) of respondents (83 out of 160) have never used Scratch. Female teachers were more likely to report having never used Scratch (59% or 21 out of 37) as compared to male teachers (50% or 61 out of 123). Government aided and public-school teachers were more likely to report that they have never used Scratch before (54% and 52% respectively) as compared to teachers from private schools (47%). Physics teachers were more likely to report having used Scratch (66%) as compared to other teachers while just over half (51%) of ICT teachers reported having used Scratch. Biology teachers were least likely to report having ever used Scratch (33%).

Out of the 160 survey respondents, 77 reported having used Scratch. Of these, 51% report that they agree or strongly agree with the statement that they enjoy using Scratch. However, females were more likely to report that they do not enjoy using scratch (49%) as compared to males (29%).

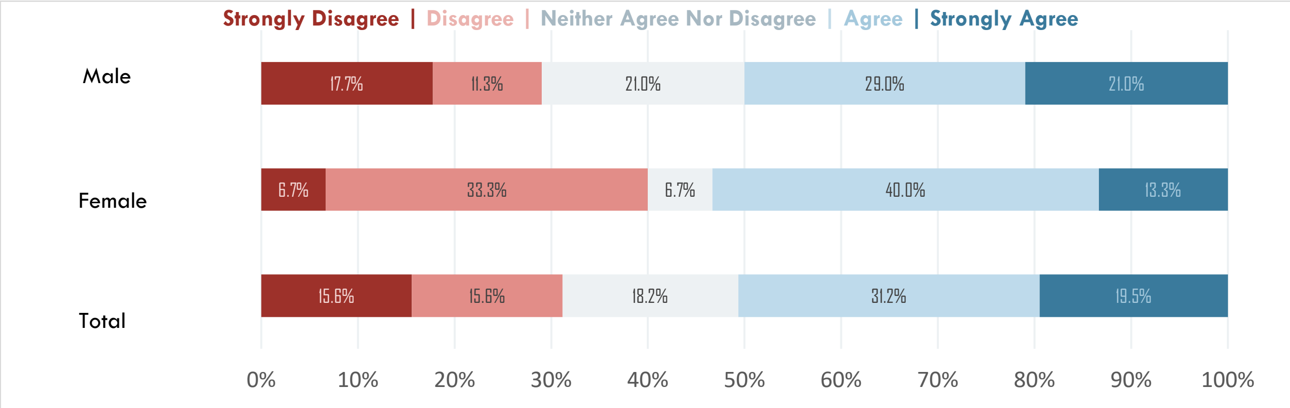

Figure 13: Percent of Teachers that have used Scratch that Responded to the Statement "I enjoy using Scratch".

Teachers who reported having used Scratch or another coding program previously were asked to evaluate their Coding/Scratch Self-Efficacy in relation to digital content and problem solving. Overall, younger teachers scored higher than older teachers, and male teacher scored higher than female. Problem solving has higher scores but were still low on a 4-point scale. Digital content creation was low overall, especially for teachers over 35 years.

Table 17: Scratch Self-Efficacy Assessment Average Score by Gender and Age (score out of 4 points)

Coding/Scratch Self-Efficacy Assessment Average Score by Category (Out of 4)	Average Total Score	Gender		Age		
		Female	Male	<30	30-35	>35
Total: Coding/Scratch Self-Efficacy (Competency 3 and 5)	0.55	0.49	0.57	0.83	0.56	0.27
Competency 3: Digital Content Creation (3.4)	0.50	0.44	0.51	0.77	0.49	0.24
Competency 5: Problem Solving (5.5)	1.86	1.66	1.92	2.82	1.86	0.90

Public schools fare the best in all areas (average 0.67) as compared to private schools (0.36).

Table 18: Scratch Self-Efficacy Assessment Average Score by School Status (score out of 4 points)

Coding/Scratch Self-Efficacy Assessment Average Score by Category (Out of 4)	School Status		
	Public	Government Aided	Private
Total: Coding/Scratch Self-Efficacy (Competency 3 and 5)	0.67	0.42	0.36
Competency 3: Digital Content Creation (3.4)	0.61	0.38	0.29
Competency 5: Problem Solving (5.5)	2.28	1.43	1.17

ICT teachers, followed by physics teachers rated themselves higher on their coding Scratch competences as compared to teachers from other subjects, with chemistry teacher scoring lowest of all teachers.

Table 19: Scratch Self-Efficacy Assessment Average Score by Teaching Subject (score out of 4 points)

Coding/Scratch Self-Efficacy Assessment Average Score by Category (Out of 4)	Teaching Subject				
	ICT	Physics	Biology	Mathematics	Chemistry
Total: Coding/Scratch Self-Efficacy (Competency 3 and 5)	0.81	0.65	0.49	0.48	0.38
Competency 3: Digital Content Creation (3.4)	0.78	0.53	0.46	0.40	0.32
Competency 5: Problem Solving (5.5)	2.80	2.12	1.68	1.58	1.25

Applied Digital Literacy Competency 3: Digital Content Creation

Overall, there is slight to no self confidence in teacher's ability for digital content creation. Teachers across the board are not confident in their ability to apply mathematical concepts, develop simple games, stories or animations in Scratch or explain basic concepts of coding.

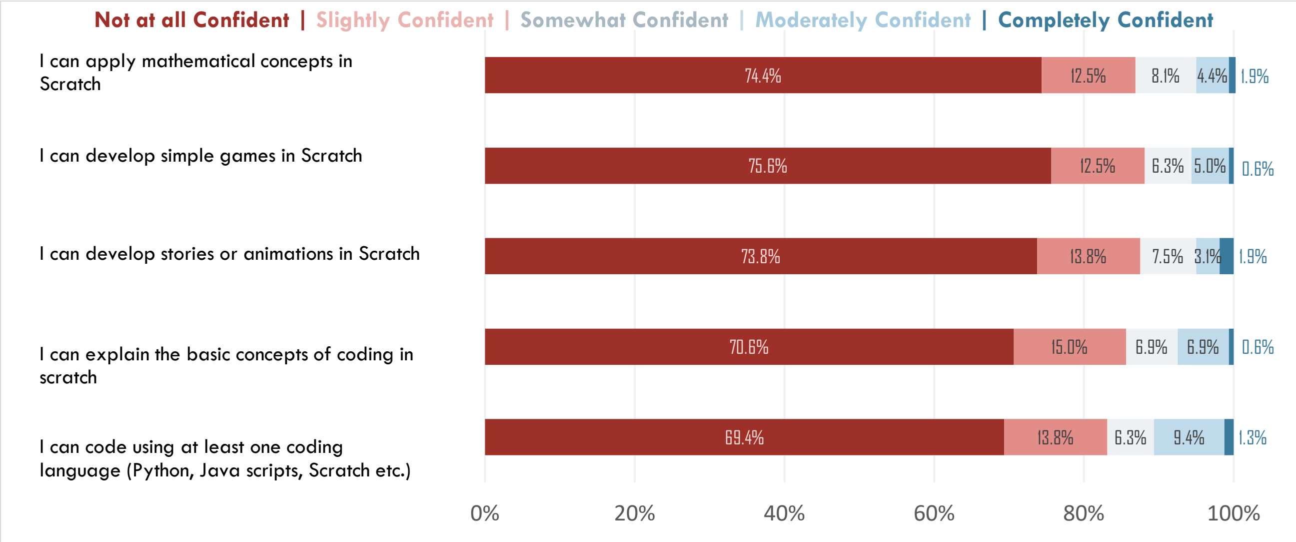

Figure 14: Applied Digital Literacy Competency 3: Digital Content Creation

Applied Digital Literacy Competency 5: Problem Solving

Similarly, there is little to no confidence in problem solving in the digital realm. Teachers reported an equal unease in areas of abstraction, reusing and remixing, experimentation, and testing of Scratch.

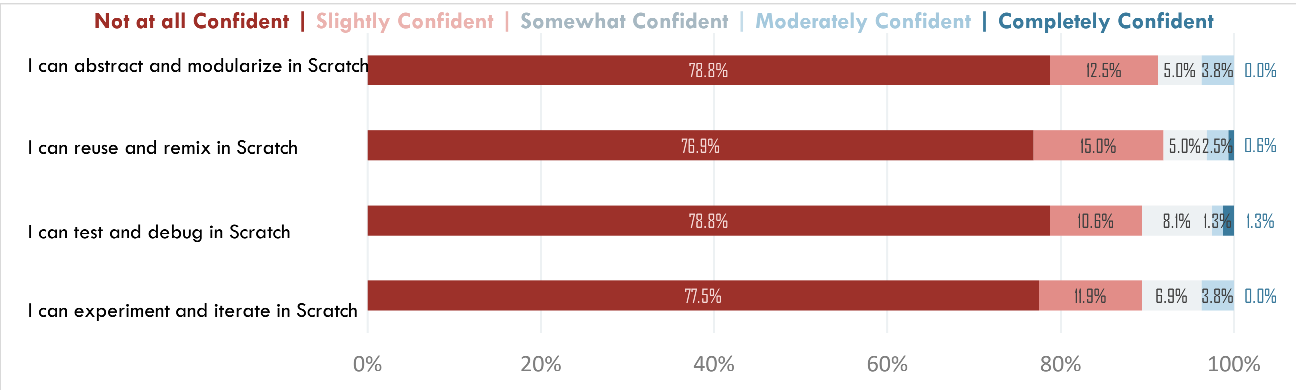

Figure 15: Applied Digital Literacy Competency 5: Problem Solving

Section 3. B. Scratch Knowledge

Based on surveyed teachers, overall understanding of computational concepts and practices are low, even amongst those who have previously used Scratch with only 81% of teachers surveyed responding correctly to more than 10 questions out of 34. Those who report having previously used Scratch fared better, with 17% correctly responding to more than 10 questions, compared to those who report never having used Scratch (0%).

Table 20: Scratch Knowledge Assessment Scores (score out of 34 points)

Scratch Knowledge Assessment (Out of 34)	All Respondents (160)	Those who have used Scratch (77)	Those who have never used Scratch (83)
Average Score	3.4	5.2	1.7
Maximum Score	29	29	8
0 Correct Responses	37.5%	28.6%	45.8%
1-10 Correct Responses	54.4%	54.5%	54.2%
11 or more Correct Responses	8.1%	16.9%	0.0%

Scratch Competency Assessment Score

Computational scores for both concepts and practices are low for those who have used Scratch, and extremely low for those who have never used the program.

Table 21: Scratch Assessment Scores for Computational and Practice Questions

Computational Concept/Practice	All Respondents (160)	Those who have used Scratch (77)	Those who have never used Scratch (83)
Computational Concepts (out of 5)	1.01	1.47	0.58
Computational Practices (out of 8)	0.88	1.09	0.67

While there is a difference in competencies by Scratch modules between those who have used Scratch in the past, and those who have never used Scratch, overall competency in Scratch is low, particularly in use of Math Operator Blocks.

Table 22: Module-Based Scratch Assessment Scores (scores on a 4 point scale)

Scratch Assessment Scores by Module (Out of 4)	All Respondents (160)	Those who have used Scratch (77)	Those who have never used Scratch (83)
Module 1: Scratch Interface Elements[1]	0.40	0.78	0.05
Module 1: Using Math Operator Blocks	0.10	0.21	0.00
Module 2: Motion and Direction in XY Coordinates	0.40	0.73	0.10
Module 3 and 4: Story Creation and Animation in Scratch	0.43	0.73	0.14
Module 5: Polygons and Flowers	0.28	0.47	0.10
Module 6 and 7: Games	0.28	0.47	0.10

Physics teachers and private teachers were more likely to score high on the Scratch assessment, as physics teachers were more likely to report having used Scratch previously. Again, the scores of private school teachers were at a higher level than both government and public schools while younger teachers under the age of 30 scored higher than those over the age of 30.

Section 3. C. Access to Scratch/ Coding Support

Perceived access to support (either school-based or on-line) for coding/Scratch was assessed to determine the extent to which teachers have the resources needed to problem solve. Overall, perceived access to support is low, with an average score of 1.9 out of 12, or 1.4 for female teachers and 2.0 for male teachers. As similar patterns already suggest, private-school teachers and younger, male and physics teachers are more likely to access additional resources or get support.

[1] Module 1: Scratch Interface Elements. On the assessment, this question is worth 1 point. However, for comparison with other module specific questions, this was changed to a 4-point scale. This question still only contributes 1 point to the overall Scratch Assessment Score.

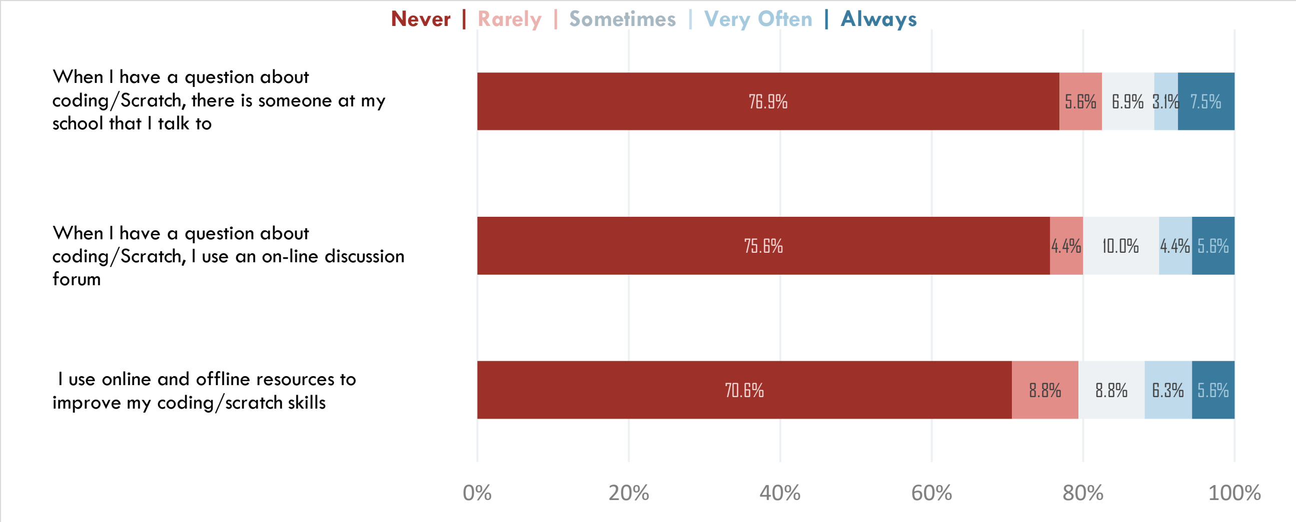

Figure 16: Access to Support for Scratch/ Coding

Out of those surveyed, 18% either agreed or strongly agreed with the statement that they are confident in their ability to resolve challenges when coding or using Scratch. A similar 18% of those surveyed either disagreed or strongly disagreed with the statement that they are confident in their ability to resolve challenges when coding or using Scratch. The majority either did not have an opinion or had never used Scratch (64%).

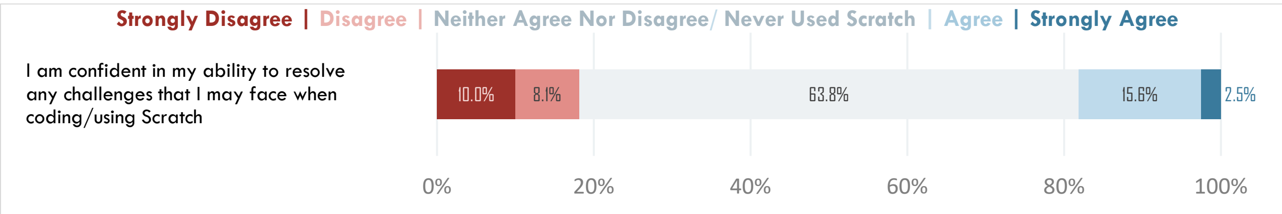

Figure 17: Confidence in Problem Solving when using Scratch

Section 4: School Clubs

Section 4. A. Enabling Environment for School Clubs

Of the teachers surveyed, 63% (100 out of 160) report that their current schools have school clubs, with 40% reporting a STEM or ICT club. Government aided schoolteachers were more likely to report that their schools have clubs (70%) as compared to public (60%) and private (53%) schoolteachers. Of those 100 schoolteachers that report having school clubs 61% report that clubs are on the school timetable (7% do not know). The majority of teachers (84%) report that clubs take place at least once per week and 70% of teachers report that club duration is one or more hours. Less than half of teachers surveyed (42%) report having led a student club either currently or in the past (35% of females and 44% of males). Most teachers surveyed agree that boys and girls participate equally in clubs (76%) while fewer agreed that students actively particate (49%) or that students participate in STEM or ICT clubs (45%).

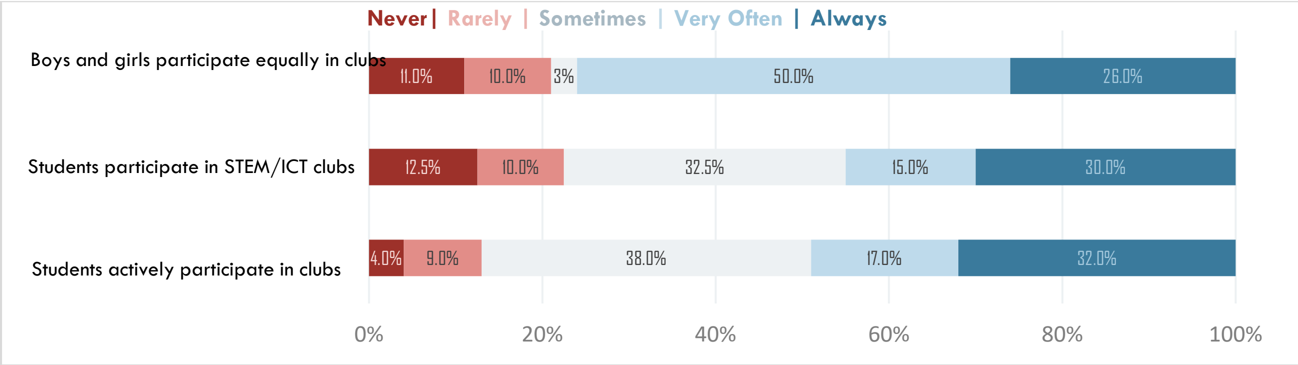

Figure 18: Student Participation in School Clubs

Section 4. B. School Club Practices

According to the survey, 18% of teachers (28 out of 160) currently lead a STEM/ICT club at their school. Broken down by gender, 8% of female teachers and 20% of male teachers report leading a club. There was little difference in teachers leading clubs by teaching subject.

Of teachers that report leading school clubs, the majority agree that they let students decide on the activities of the club (73%) and that they give students roles in the club (67%). Teachers also report that they actively encourage girls to join STEM/ICT clubs (64%).

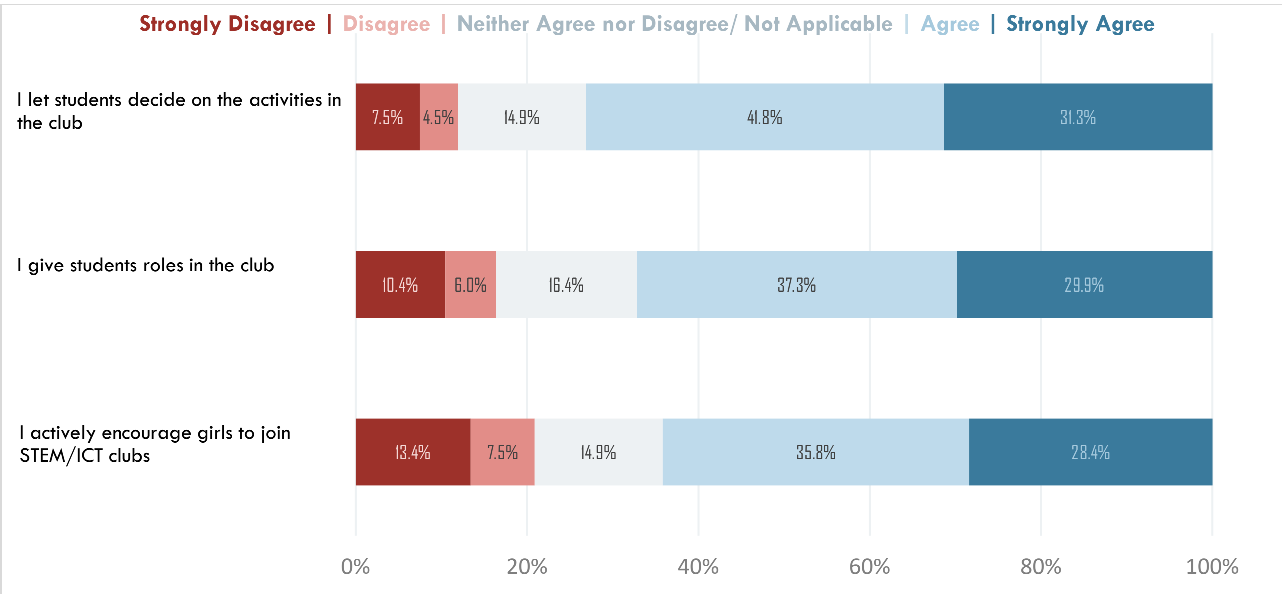

Figure 19: School Club Practices

Leadership skills for facilitating school clubs, including providing students with an active role in the club and allowing them to decide on the activities as well as encouraging girls to join STEM/ICT clubs, were combined into a leadership index score. All teachers were included in the index score, with those who have never facilitated a club scoring 0 out of 12 points. The average score across all teachers was 3.1, with females scoring lower at 2.3 compared to males 3.4. The majority of teachers scored 0 out of 12 (64%), which was higher for female (70%) as compared to male teachers (62%), reflecting the fact that most teachers have never led a school club. Overall, teachers from private schools scored higher on the assessment (4.8) as compared to government aided (3.5) and public-school teachers (2.6), most likely reflecting the fact that private school teachers are less represented in the survey as compared to both government aided and public schools.

Section 4. C. Self-Efficacy to Lead Clubs

Self-efficacy to lead a Scratch school club was assessed of all teachers, regardless of previous experience leading a school club. On average, teachers surveyed scored 6.5 out of 20 total points on the self-efficacy assessment with females scoring lower at 4.5 as compared to their male colleagues at 7.1. Based on efficacy scores, younger teachers (age 35 and under) were more confident in their ability to lead a club, with those under the age of 30 scoring 7.2 and those between 30 and 35 scoring 7.6. This is in contrast to teachers above the age of 35 who scored an average of 3.3 out of 20.

Private school teachers also scored higher on the self-efficacy index (7.6) as compared to public school teachers (7.0), with government aided schoolteachers scoring lowest (5.4). ICT teachers were more likely to report confidence in leading a club with an average score of 7.8 as compared to teachers from other subjects, which likely reflects their familiarity with digital technologies.

Generally, teachers were not confident in their ability to lead Scratch clubs, with only 28% of teachers reporting that they were either moderately or completely confident that they could lead a Scratch club at their school. However, more teachers were confident in their ability to motivate students to participate (33%) and evaluate club achievement (30%).

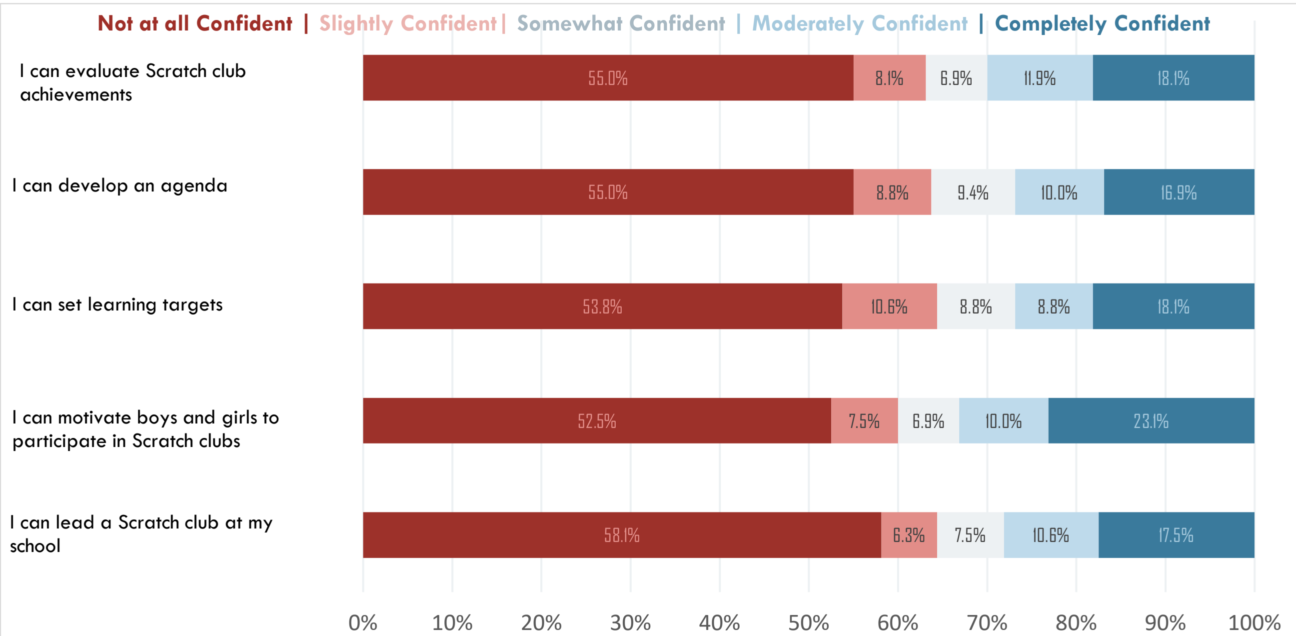

Figure 20: Teacher Self-Efficacy to Lead School Clubs

Section 5: Scratch/Coding in the Classroom

Survey results show that male and female teachers have similar attitudes about using coding and scratch in the classroom, but male teachers are more likely to be currently using Scratch or coding in the classroom and exhibit higher self-efficacy to do so. Private school teachers were also more likely to score high in their attitudes towards coding and use of coding in the classroom.

Section 5. A. Attitudes about Scratch/Coding in the Classroom

Attitudes regarding the use of Scratch and coding in the classroom was assessed through an attitude index on the importance of the use of coding in the classroom. The average score across all teachers is 6.6 out of 12, with female teachers averaging 6.4 and male teachers 6.7. As noted in previous sections, ICT teachers have a better attitude towards coding with scoring an average of 7.5, as compared to 6.8 for math teachers and 6.4 for physics teachers. Private school teachers also scored higher on average (9.2) as compared to public (6.4) and government-aided schoolteachers (6.1).

The score for attitudes around coding in the classroom excludes the two reverse questions (‘*Boys are naturally better at coding than the girls at my school’* and ‘*It is not important to incorporate digital technologies like Scratch into the classroom if the school already has a Coding or Scratch club’*) as these questions were ultimately not correlated with the other questions. In addition, these questions brought varied responses from teachers. A total of 37% of teachers disagree with the statement that boys are naturally better than coding than girls and agree that both boys and girls can benefit from learning to code. However, 44% of teachers, while they disagree with the statement that boys are naturally better than coding than girls, they also disagree with the statement that boys and girls can equally benefit from learning to code. Some teachers (18%) do believe that boys are better than girls at coding, but that girls can equally benefit from learning to code. Finally, 2% of teachers say that boys are better than girls in coding and that that boys and girls do not equally benefit from learning to code.

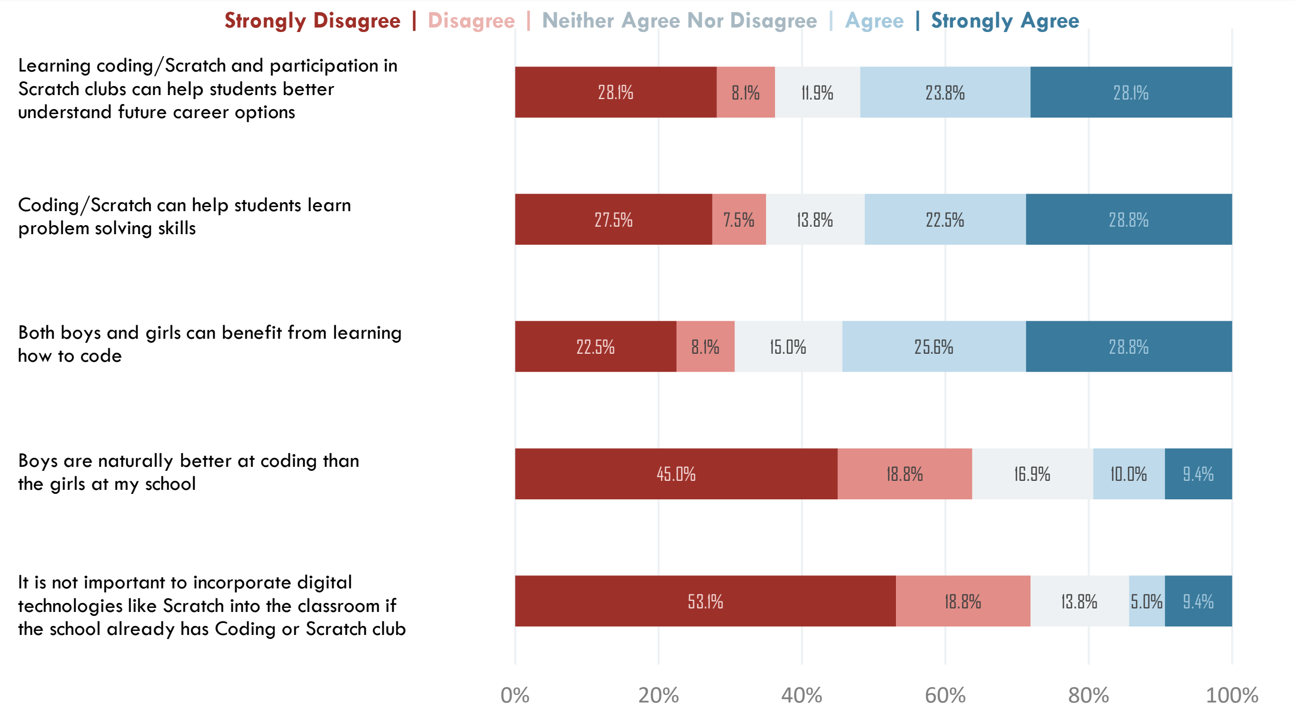

Figure 21: Teacher Attitudes on the use of Scratch in the Classroom

Section 5. B. Practices around Scratch/Digital Technologies in the Classroom

The extent to which teachers are currently incorporating Scratch and digital technologies in the classroom was assessed through nine questions on engaging students and incorporating digital technologies in the classroom. Teachers scored on average 14.2 out of 36 on assessment of practices around the use of Scratch or digital technologies in the classroom, with female teachers scoring lower than male teachers with an average score of 11.0 out of 36 for females compared to 15.2 for males. Overall, female teachers appear to be less likely to be currently using Scratch or digital technologies in the classroom as compared to their male colleagues. In addition, private school teachers scored higher on average (19.0) as compared to public (14.2) and government-aided schoolteachers (13.1). As expected, ICT teachers were more likely to report that they use Scratch or digital technologies in the classroom (12% scored more than 30 out of 36) as compared to Mathematics or Physics teachers (8% and 6%, respectively).

Teachers surveyed reported that they were more likely to teach students to behave safely online (42%) and give credit to other's work (38%) as compared to using digital technologies to support students to identify and solve problems (26%) or to tailor teaching to a student's specific needs (27%).

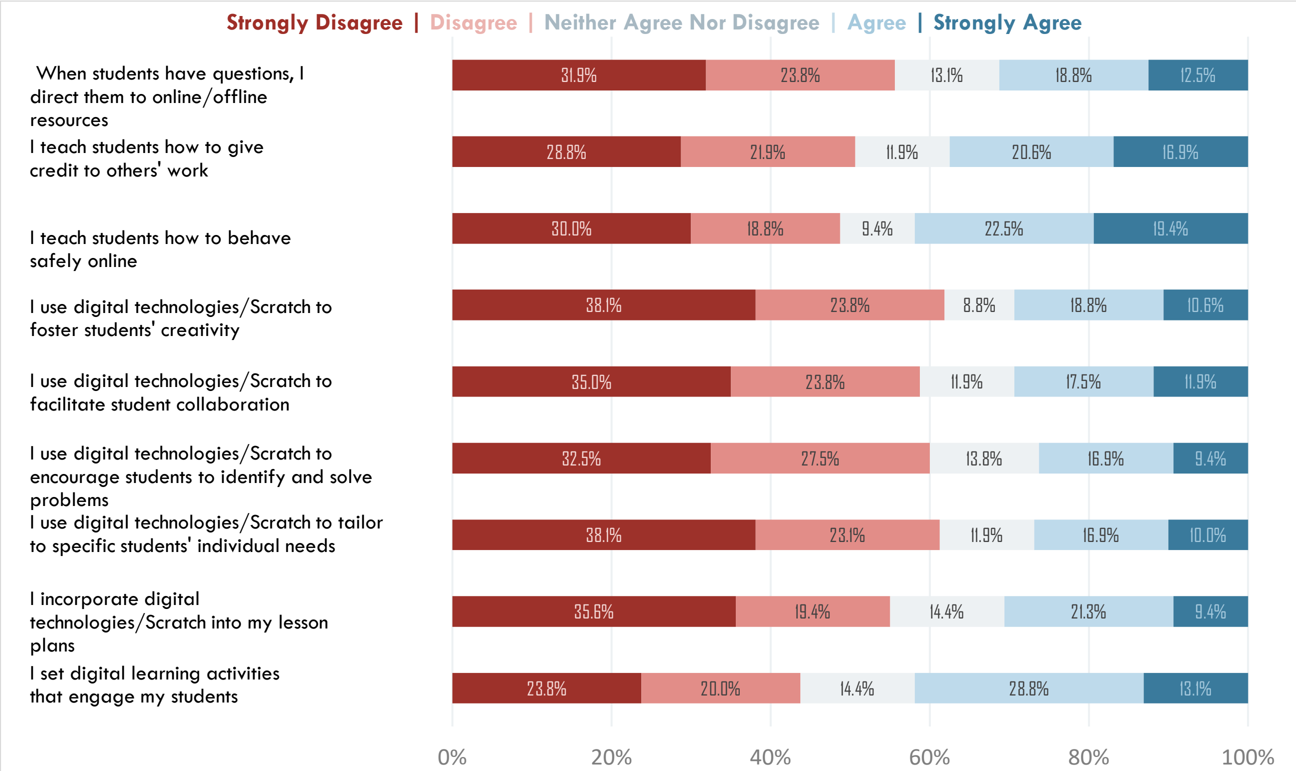

Figure 22: Teacher Practices on use of Scratch/ Digital Technologies in the Classroom

Section 5. C. Self-Efficacy for Coding in the Classroom

Self-efficacy or confidence in the ability to incorporate Scratch or coding in the classroom was assessed through survey questions on available support for integration of coding as well as confidence in ability to incorporate Scratch or coding into lesson plans. On average, teachers scored 3.6 out of 12, with male teachers averaging higher at 3.8 as compared to 2.9 for females. Private school teachers also scored higher (6.5) on average as compared to public (3.4) and government aided schoolteachers (3.0).

Most teachers disagreed with the statement that other teachers talk about the use of digital technologies (65%) and that school leaders support them to integrate Scratch or digital technologies into lesson plans (68%). Only 22% agreed that they had the skills to incorporate Scratch into their lesson plans.

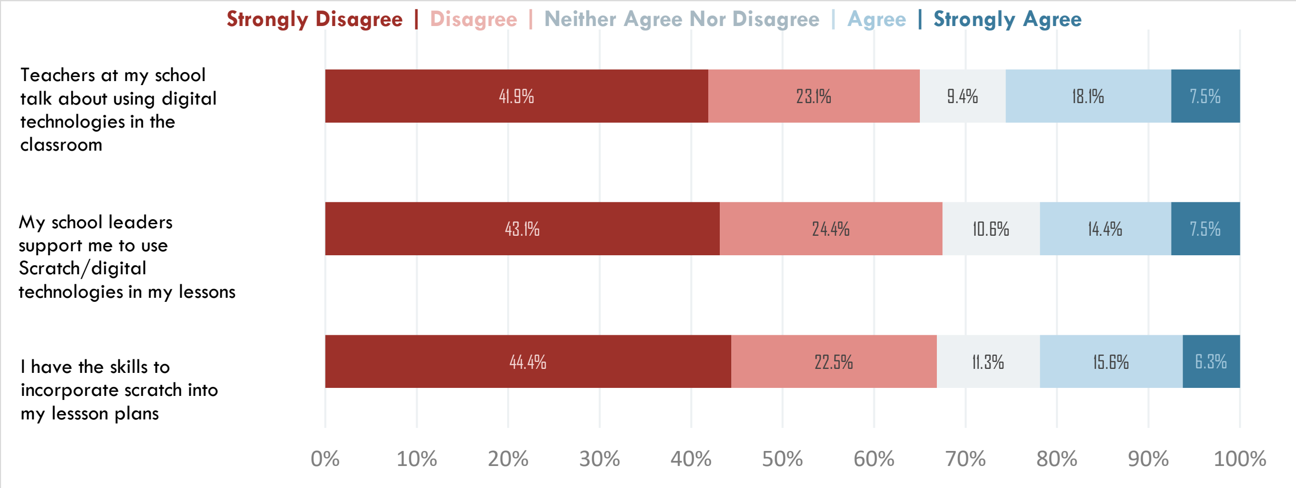

Figure 23: Teacher Self-Efficacy on the Use of Scratch/ Coding in the Classroom

Section 6: Summary of Findings

Findings highlight that, while teachers have low baseline knowledge in Scratch and, subsequently lower rates of self-efficacy to perform tasks using Scratch or solve problems when using Scratch, they generally have a positive attitude towards coding. The majority of teachers report never having led a school club (58%), which is reflected in both low assessment scores for confidence to lead a club and current practices. The following table summarizes the assessment scores across all categories assessed through the baseline KAP survey.

Table 23: KAP Findings by Assessment Area

Category	Baseline Average Score	Total Possible Score	Average Score on 100-point Scale		
			Total	Female	Male
School Environment					
Environment for Digital Literacy	15.9	40	40	32	42
Content Knowledge					
Digital Literacy	67	100	67	61	69
Scratch Knowledge	3.4	34	10	8	11
Attitudes					
Enjoyment of Scratch/ Coding *(of those who have used Scratch)*	39	77	51	53	50
Importance of Scratch/Coding in the Classroom	6.6	12	55	53	56
Self-Efficacy					
Confidence to perform tasks using Scratch	0.55	4	14	12	14
Confidence to solve problems when using Scratch	1.9	12	16	12	17
Confidence to lead a Club	6.5	20	33	23	36
Confidence to integrate Scratch into lesson plans	3.6	12	30	24	32
Practices					
Leading Clubs	3.1	12	26	19	28
Incorporating Scratch/ Coding in Lessons	14.2	36	39	31	42

Conclusions and Recommendations

Conclusions

Scores across all areas assessed highlight room for further improvement on digital literacy and coding skills. The majority of teachers surveyed (63%) do meet the minimum level of proficiency for digital literacy skills, however only 38% meet high level of proficiency for digital literacy skills and 0.6% meet the minimum proficiency for Scratch. While proportionally fewer female teachers meet the minimum level of proficiency for digital literacy as compared to males, the difference between them is 8%. This gap widens to 24% when looking at those teachers who have achieved a high level of proficiency. Female teachers were also less likely to have previously used Scratch (41%) as compared to their male colleagues (50%), however scores on the Scratch assessment were low for both genders likely reflecting a lack of formal training and experience.

These findings indicate that, despite their higher overall levels of education, female teachers have had fewer opportunities to develop their digital literacy skills. This is also supported when looking at access to CPD opportunities for digital literacy, while female and male teachers report similar levels of access to opportunities (89% respectively), male teachers were more likely to report participating in more activities with 41% of males reporting more than one CPD activity as compared to 30% of females. In addition, male teachers were more likely to report more formal training opportunities such as attending an in-person course or seminar or attending an accredited course as compared to female teachers (as no female teacher reported attending an accredited course). This may partially be attributed to gender dynamics and availability of time. Previous qualitative work with teachers highlights challenges for female teachers to participate in activities outside of school hours due to household responsibilities such as childcare.[3] To note, female trained secondary teachers make up 23.1% of the overall sample for this study. Schools selecting the participants for this study reported that teachers in science are often male. Of the three teachers in each school teaching science, school selected at least one female teacher whenever possible. Therefore, this sample may reflect a representative sample of the selected schools male to female ratio for science teachers.

Male teachers were also more likely to report having participated in the UR-CE / VVOB Certificate Course, with 7% reporting participating in either the blended or fully online course as compared to 3% of females. As the course required the participants to be familiar with the online learning environment, including completing assignments and uploading them to Moodle, and offered a digital literacy course at the outset, these teachers would have already likely developed a higher level of digital literacy. This was also demonstrated when comparing digital literacy skills for those who participated in the fully online Certificate Course, where 90% achieved high digital literacy, as compared to 33% of those who did not participate in the course or participated in the in-person course.

Female teachers were also less likely to report that they are currently leading or have previously led a club at their schools as compared to their male colleagues (35% of females as compared to 44% of males) or are currently leading a STEM/ICT club (8% of females and 20% of males). In addition, while both have similar attitudes towards the use of coding or Scratch in the classroom, male teachers are more likely to be currently using coding or Scratch in the classroom and exhibit greater self-efficacy to do so.

While only comprising 30% of the teachers enrolled in the pilot project, female teachers may require additional support to develop similar “starting” levels of digital literacy and coding skills as compared to their male colleagues and support when initiating coding clubs. This could take place through additional check-in meetings with project staff and coding students from RCA.

The main challenge that may threaten the ability of the project to achieve its key objectives are the school-based environmental factors. One quarter of teachers surveyed reported that their school never has electricity, more than one third report that they never have access to computers for student use (38%) or teacher use (36%) and

[3] VVOB Leading Teaching and Learning Together Midterm Evaluation, 2020

nearly half (48%) report that they never have access to the internet. More than half of teachers (56%) also report that they do not have access to assistive devices for those with special needs.

Private schools tend to be better resourced as compared to both public and government aided schools. On the assessment of school environment, on average, teachers surveyed scored 15.9 out of a total of 40 (or 40%), whereas private school teachers scored 25.7 (or 64%). The score combined both factors related to the physical environment as well as school leadership support for the use of digital technologies, however private schools exceeded public and government aided schools when it comes to the physical environment, including access to computers for teacher and student use as well as internet. All schools scored similarly on the school leadership support component, which highlighted a need for further school leadership engagement in supporting the use of digital technologies in the school.

Without access to electricity and computers for both teacher and student use, there will be few opportunities for both to practice and gain the skills, particularly at public and government aided schools and incorporating Scratch in the classroom. While Scratch can be downloaded to devices and operated off-line, students will still require access to a charged computer. The project has already engaged school leaders and distributed computers to participating schools, however further monitoring will be required to ensure teachers and students are accessing these computers.

Recommendations

- Explore gender dynamics of time availability for female teachers to access external trainings and events as well as time availability to facilitate clubs, particularly at schools where clubs take place outside of school hours. Discuss these time limitations with teachers and school administrators to ensure that female teachers can equally participate in the Scratc^{2}h 2050 pilot project.

- Consider providing supplementary support, including regularly scheduled visits or phone calls, to female teachers and teachers who have less experience and confidence to facilitate a Scratch club and incorporate Scratch and digital technologies in the classroom, including those that teach subjects other than ICT or physics.

- Utilize findings from the needs assessment to identify the areas of concern with regards to access to electricity and computers for student use and support teachers to identify mitigation measures, including suggesting the ideal group size for sharing computers or resources.

- Finally, identify schools where access to assistive technology is low but where there is an identified need. Follow up with NUDOR and Rwanda Union of the blind for more insights as to how to provide comprehensive services to these schools.

Annex 1: Data

1.1 Demographic Data

Gender and Age

Table 24: Age By Gender

Age Range	Total	% Total	Total Female	% Female	Total Male	% Male
20-29	37	23.1%	10	27.0%	27	22.0%
30-39	110	68.8%	23	62.2%	87	70.7%
40-49	12	7.5%	4	10.8%	8	6.5%
50-59	1	0.6%	0	0.0%	1	0.8%
Total	160		37		123	

Table 25: Age Range for Analysis by Gender

Age Range	Total	% Total	Total Female	% Female	Total Male	% Male
<30	37	23.1%	10	27.0%	27	22.0%
30-35	86	53.8%	17	45.9%	69	56.1%
>35	37	23.1%	10	27.0%	27	22.0%
	160		37		23	

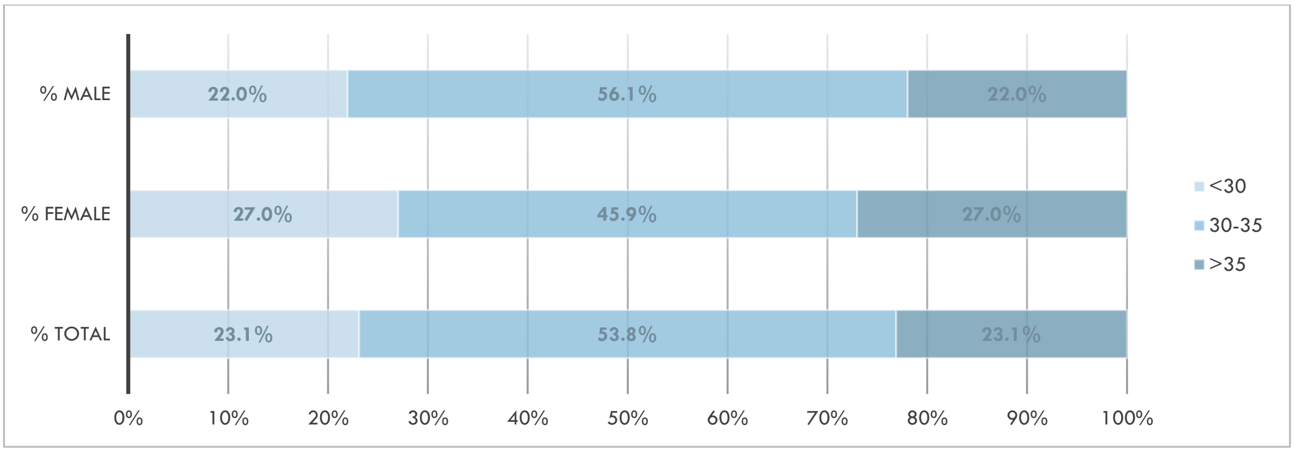

Figure 24: Age range by Gender

Education

Table 26: Highest Education Attainment by Gender

Education	Total	% Total	Total Female	% Female	Total Male	% Male
A2 in Education	4	2.5%	1	2.7%	3	2.4%
Diploma in Education	55	34.4%	8	21.6%	47	38.2%
Bachelor's degree	83	51.9%	21	56.8%	62	50.4%
Master's degree	2	1.3%	0	0.0%	2	1.6%
Post-Graduate Diploma in Education	13	8.1%	6	16.2%	7	5.7%
Any other specify	3	1.9%	1	2.7%	2	1.6%
Total	160		37		123	

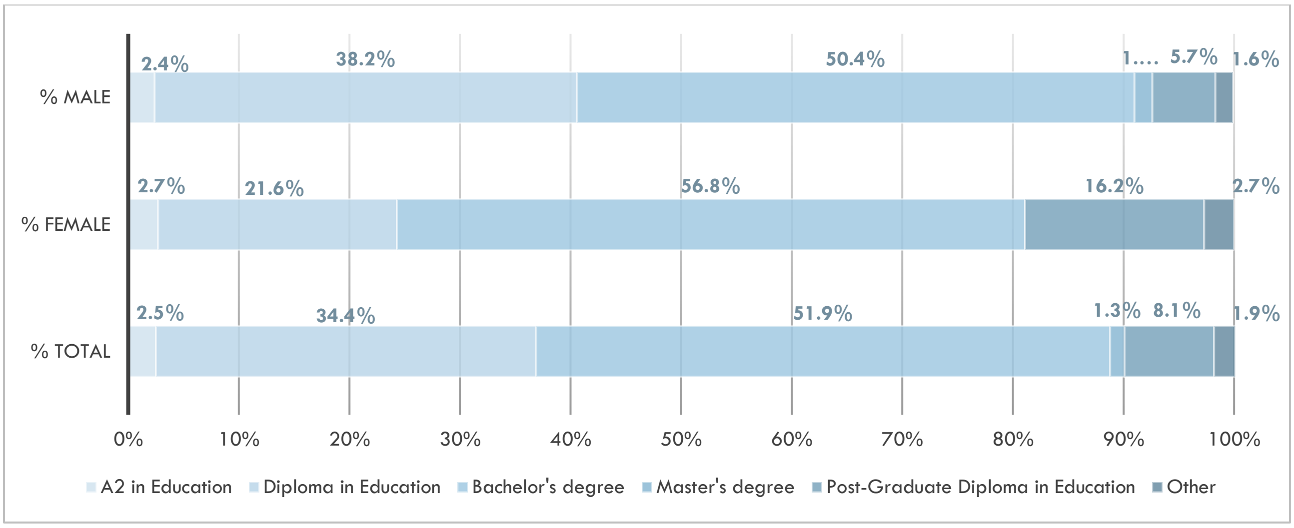

Figure 25: Highest Education Attainment by Gender

School

Table 27: Number of Schools by School Status and Designation

School Status by Academic Designation	9YBE	12YBE	Secondary only	Total	% of Total
Public	12	14	3	29	55.8%
Government Aided	5	11	1	17	32.7%
Private	0	0	6	6	11.5%
Total	17	25	10	52	
% of Total	32.7%	48.1%	19.2%		

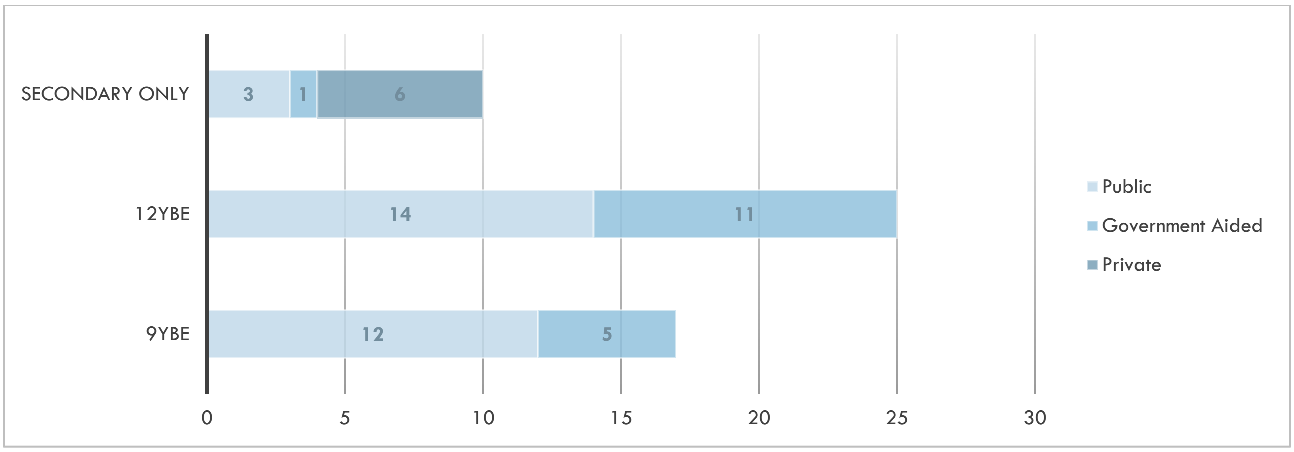

Figure 26: Number of Schools by School Status and Designation

Teachers by School Type

Table 28: Teachers Surveyed by School Status

Teachers by School Status	Total	% Total	Total Female	% Female	Total Male	% Male
Public	87	54.4%	20	54.05%	67	54.47%
Government Aided	54	33.8%	13	35.14%	41	33.33%
Private	19	11.9%	4	10.81%	15	12.20%
Total	160		37		123	

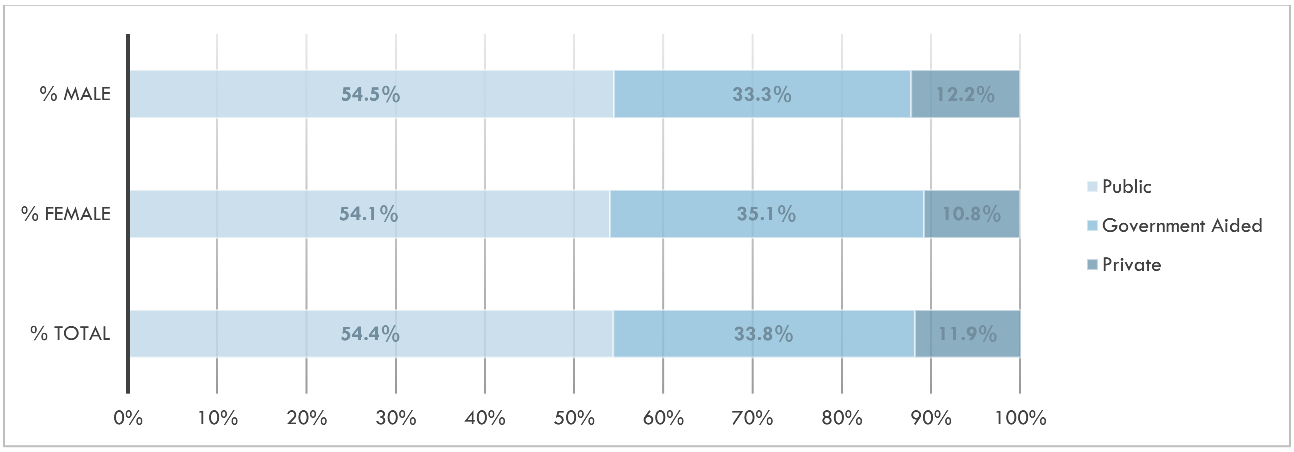

Figure 27: Teachers Surveyed by School Status

Table 29: Teachers Surveyed by School Type

Teachers by School Type	Total	% Total	Total Female	% Female	Total Male	% Male
Day School	131	81.9%	31	83.78%	100	81.30%
Boarding School	29	18.1%	6	16.22%	23	18.70%
Total	160		37		123	

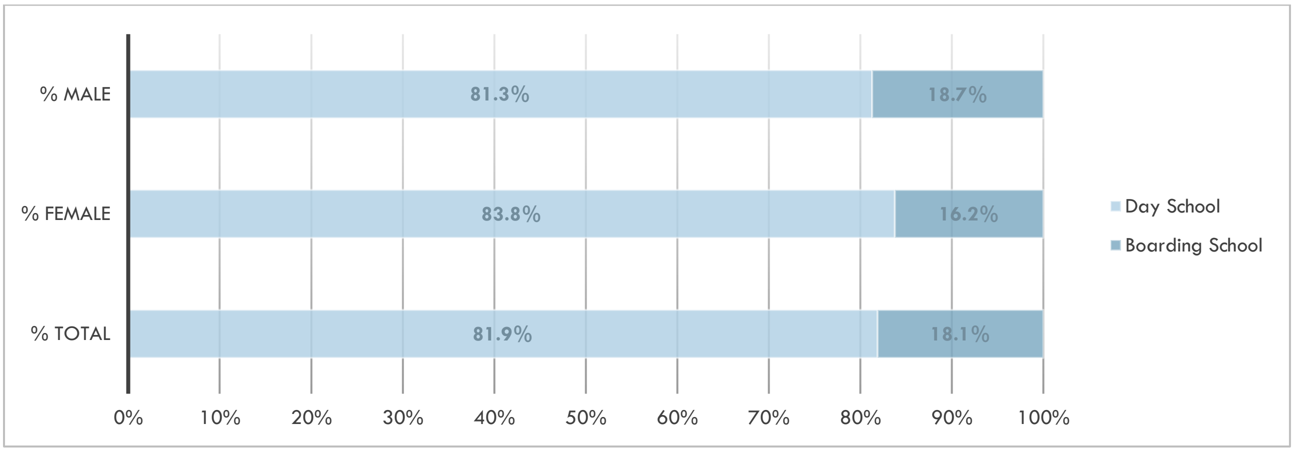

Figure 28: Teachers Surveyed by School Type

Table 30: Teachers Surveyed by School Academic Designation

Teachers by School Academic Designation	Total	% Total	Total Female	% Female	Total Male	% Male
9YBE	52	32.5%	13	35.14%	39	31.71%
12YBE	76	47.5%	18	48.65%	58	47.15%
Secondary only	32	20.0%	6	16.22%	26	21.14%
Total	160		37		123	

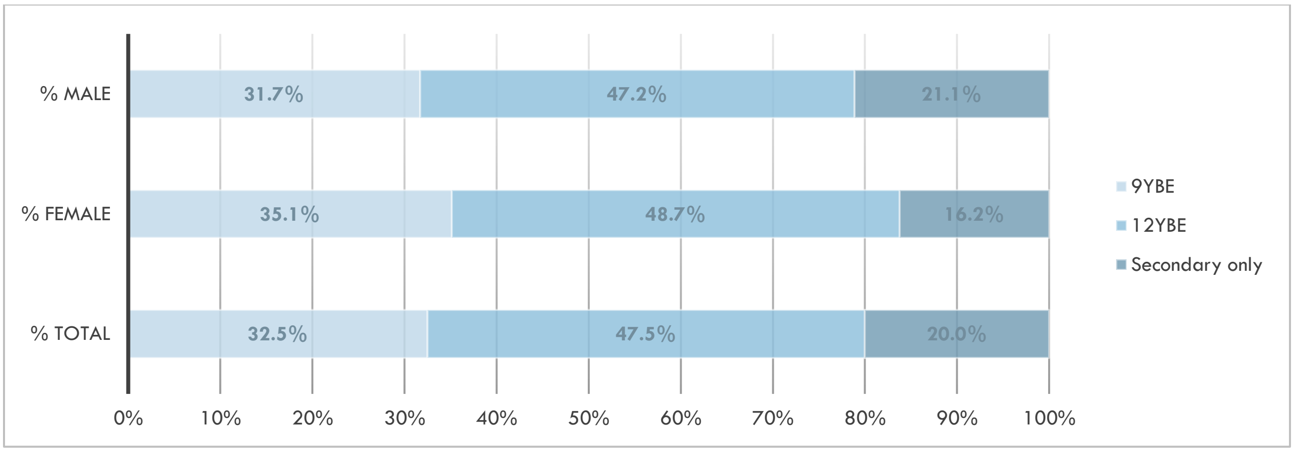

Figure 29: Teachers Surveyed by School Academic Designation

Table 31: Teachers Surveyed by School Status and Academic Designation

Teachers by School Status and Academic Designation	Public	Government Aided	Private	Total
9YBE	21.9%	10.6%	0.0%	32.5%
12YBE	26.9%	20.6%	0.0%	47.5%
Secondary only	5.6%	2.5%	11.9%	20.0%
Total	54.4%	33.8%	11.9%	

Teaching Subjects

Table 32: Teachers Surveyed by Teaching Subject

Subject	Total	% Total	Total Female	% Female	Total Male	% Male
Mathematics	59	36.9%	11	29.7%	48	39.0%
ICT	57	35.6%	12	32.4%	45	36.6%
Biology	40	25.0%	14	37.8%	26	21.1%
Chemistry	39	24.4%	11	29.7%	28	22.8%
Physics	35	21.9%	4	10.8%	31	25.2%

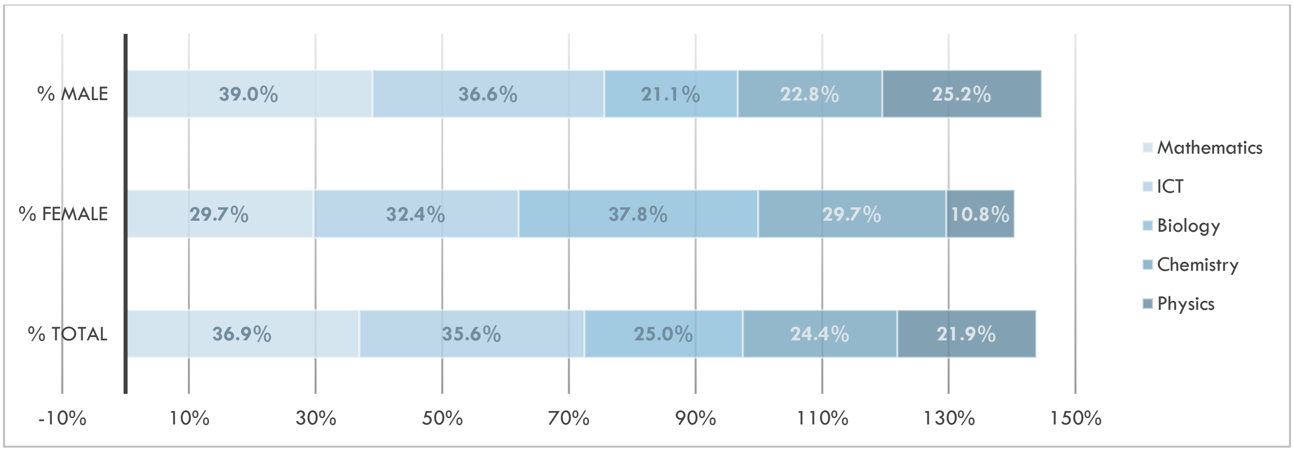

Figure 30: Teachers Surveyed by Teaching Subject

Teaching Experience

Table 33: Number of Years Teaching at Current School by Gender

Years Teaching at current school	Total	% Total	Total Female	% Female	Total Male	% Male
< 2 years	66	41.3%	20	54.1%	46	37.4%
2 or 3	27	16.9%	5	13.5%	22	17.9%
4 or 5	16	10.0%	3	8.1%	13	10.6%
6 to 9	30	18.8%	3	8.1%	27	22.0%
10 or more	21	13.1%	6	16.2%	15	12.2%
Total	160		37		123	

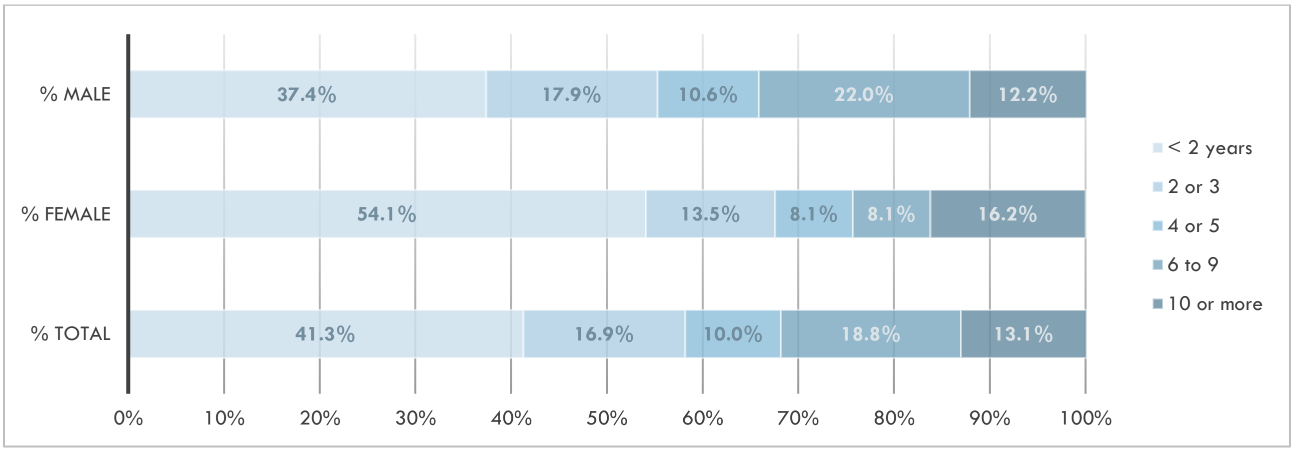

Figure 31: Number of Years Teaching at Current School by Gender

Table 34: Number of Years Teaching at Current School by School Status

Years Teaching at current school	Public	% Public	Government Aided	% Government Aided	Private	% Private
< 2 years	38	43.7%	21	38.9%	7	36.8%
2 or 3	17	19.5%	9	16.7%	1	5.3%
4 or 5	10	11.5%	5	9.3%	1	5.3%
6 to 9	11	12.6%	13	24.1%	6	31.6%
10 or more	11	12.6%	6	11.1%	4	21.1%
Total	87		54		19	

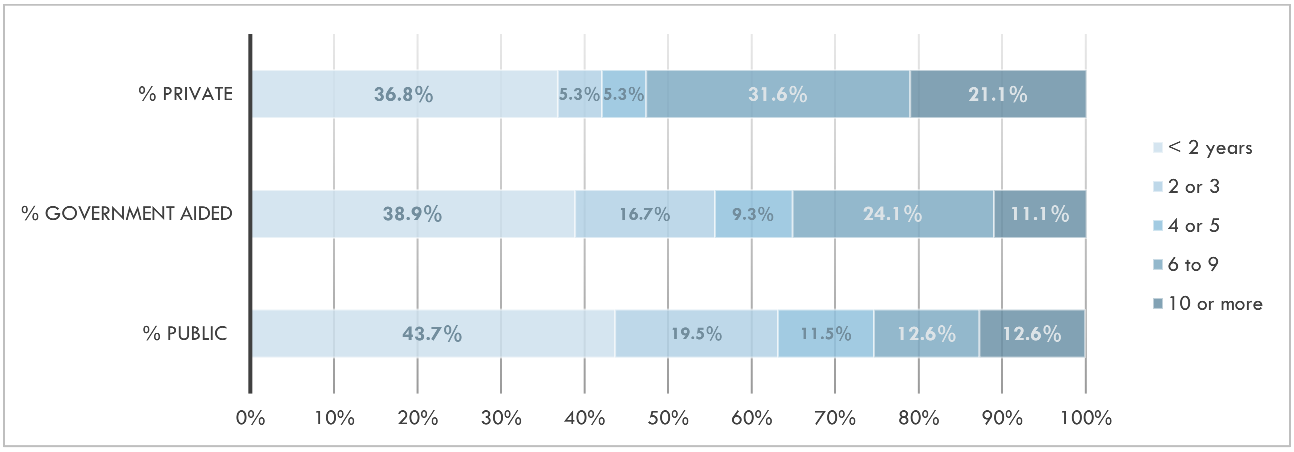

Figure 32: Number of Years Teaching at Current School by School Status

Table 35: Cumulative Number of Years Teaching by Gender

Years Teaching (Total)	Total	% Total	Total Female	% Female	Total Male	% Male
< 2 years	35	21.9%	10	27.0%	25	20.3%
2 or 3	25	15.6%	6	16.2%	19	15.4%
4 or 5	20	12.5%	4	10.8%	16	13.0%
6 to 9	43	26.9%	6	16.2%	37	30.1%
10 or more	37	23.1%	11	29.7%	26	21.1%
Total	160		37		123	

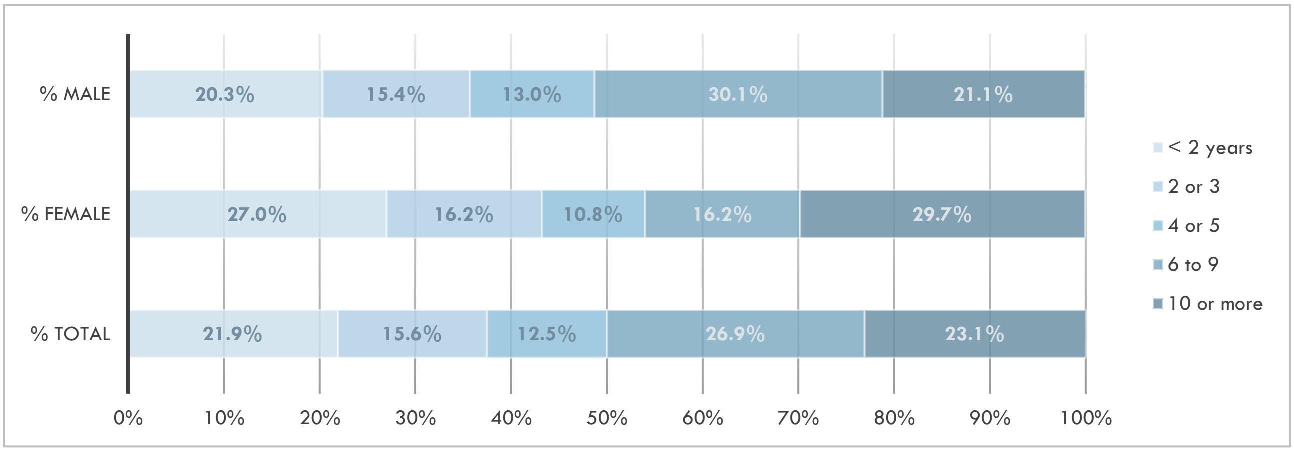

Figure 33: Cumulative Number of Years Teaching by Gender

Table 36: Cumulative Number of Years Teaching by School Status

Years Teaching (Total)	Public	% Public	Government Aided	% Government Aided	Private	% Private
< 2 years	17	19.5%	11	20.4%	7	36.8%
2 or 3	16	18.4%	8	14.8%	1	5.3%
4 or 5	15	17.2%	4	7.4%	1	5.3%
6 to 9	24	27.6%	15	27.8%	4	21.1%
10 or more	15	17.2%	16	29.6%	6	31.6%
Total	87		54		19	

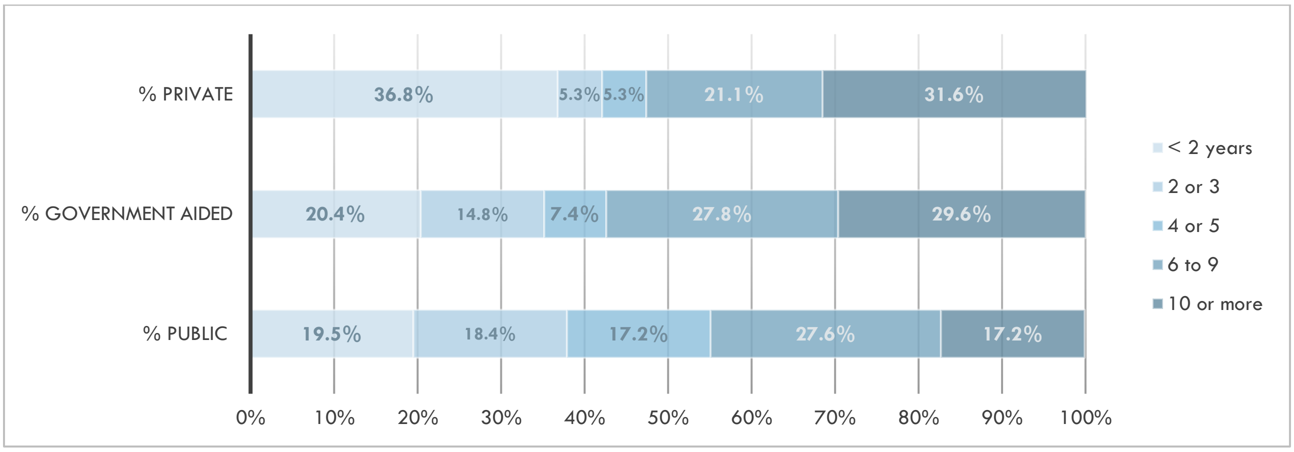

Figure 34: Cumulative Number of Years Teaching by School Status

Participation in UR-CE/VVOB CPD program

Table 37: Teacher Participation in UR-CE/ VVOB Certificate Course

CPD Program	Total	% Total	Total Female	% Female	Total Male	% Male
In-person course	32	20.0%	4	10.8%	28	22.8%
Online course	10	6.3%	1	2.7%	9	7.3%
Blended course	14	8.8%	2	5.4%	12	9.8%
No	102	63.8%	29	78.4%	73	59.3%
Don't know	2	1.3%	1	2.7%	1	0.8%
Total	160		37		123	

Table 38: Number of teachers surveyed per school who report participating in the CPD program

Number of staff per school	Total Schools	% Total
3 Teachers	4	7.7%
2 Teachers	12	23.1%
1 Teacher	20	38.5%
No Teachers	16	30.8%
Total	52	

Table 39: Number of teachers surveyed per school who report participating in the CPD program by school status

Number of staff per school	Public	% Public	Government Aided	% Government Aided	Private	% Private
3 Teachers	3	10.3%	1	5.9%	0	0.0%
2 Teachers	7	24.1%	3	17.6%	2	33.3%
1 Teacher	10	34.5%	9	52.9%	1	16.7%
No Teachers	9	31.0%	4	23.5%	3	50.0%
Total	29		17		6	

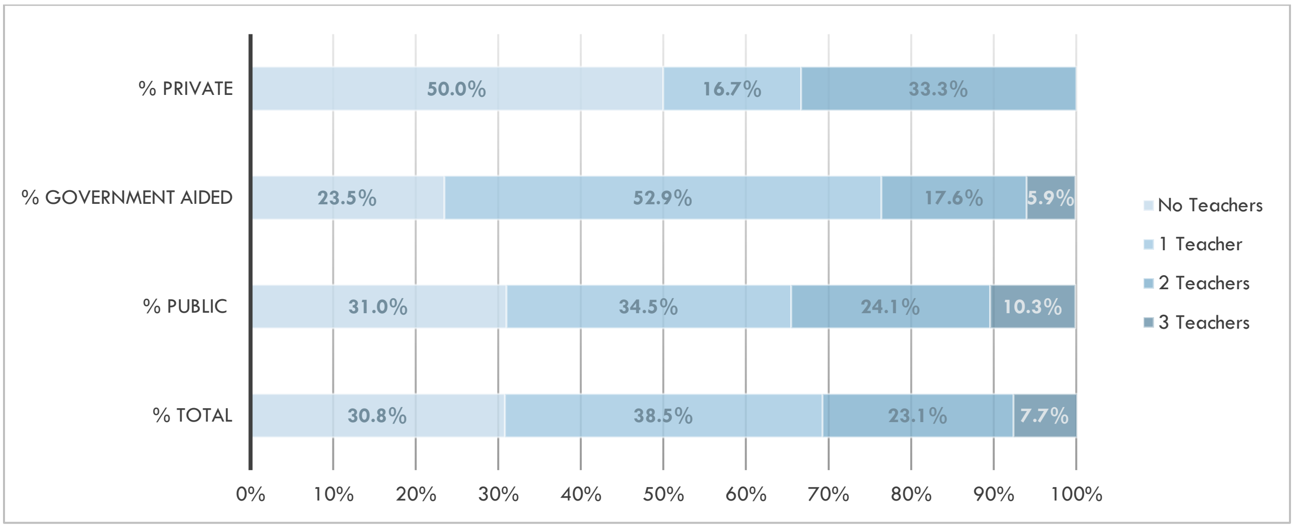

Figure 35: Number of teachers surveyed per school who report participating in the CPD program by school status

1.2: Digital Literacy Data

Section 2. A. Enabling School Environment: Digital Learning

Enabling School Environment Score

Table 40: Enabling School Environment Scores (out of 40 points)

Score out of 40	Total	Female	Male	<30	30-35	>35	ICT	Math	Physics	Government Aided	Private	Public
0-9	34%	49%	30%	32%	36%	32%	35%	36%	26%	31%	0%	44%

10-19	26%	19%	28%	19%	28%	27%	19%	29%	29%	28%	11%	28%
20-29	23%	22%	24%	35%	20%	19%	19%	24%	26%	24%	58%	15%
30-39	17%	11%	19%	14%	16%	22%	26%	12%	20%	17%	32%	14%

Physical Environment

Table 41: School Physical Environment for Digital Literacy

Availability of:	Always		Very often		Sometimes		Rarely		Never	
	Total	%	Total	%	Total	%	Total	%	Total	%
Electricity	93	58.1%	10	6.3%	10	6.3%	7	4.4%	40	25.0%
School Computers for Student Use	49	30.6%	13	8.1%	23	14.4%	14	8.8%	61	38.1%
Digital Devices for Teacher Use	43	26.9%	14	8.8%	27	16.9%	18	11.3%	58	36.3%
Internet	42	26.3%	11	6.9%	18	11.3%	12	7.5%	77	48.1%
Tech Support	25	15.6%	14	8.8%	28	17.5%	17	10.6%	76	47.5%
Assistive Technology for Students with Special Needs	12	7.5%	7	4.4%	30	18.8%	22	13.8%	89	55.6%

Table 42: Number of Smart Classrooms

Number of Smart Classrooms	Total	% Total
1	30	18.8%
2	38	23.8%
3	3	1.9%
No/Don't Know	89	55.6%
Total	160	

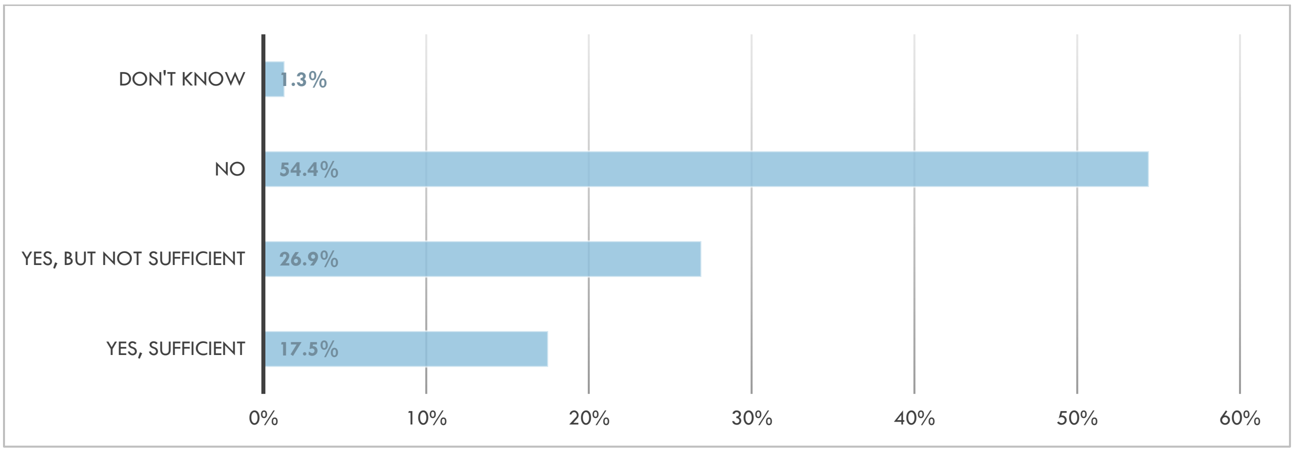

Figure 36: Reported Sufficiency of Smart Classrooms at Schools

Table 43: Teacher Reported Number of Computers

Number of Computers	Total	% Total
0	30	18.8%
< 10	52	32.5%
10 - 99	36	22.5%
100+	42	26.3%
Total	160	

Table 44: Number of Computers and School Status

Number of computers	Public	% Public	Government Aided	% Government Aided	Private	% Private
0	12	13.8%	14	25.9%	4	21.1%
< 10	31	35.6%	17	31.5%	4	21.1%

10 - 99	20	23.0%	10	18.5%	6	31.6%
100+	24	27.6%	13	24.1%	5	26.3%
Total	87		54		19	

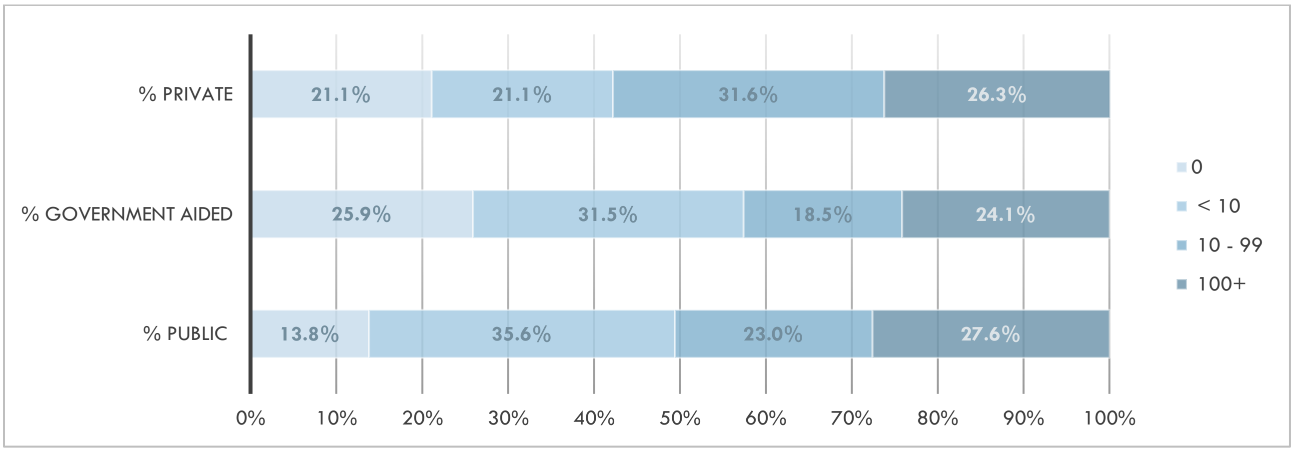

Figure 37: Number of Computers and School Status

School Leadership Support

Table 45: Support from School Leaders for Digital Literacy

Support from School Leaders to:	Always		Very often		Sometimes		Rarely		Never	
	Total	%	Total	%	Total	%	Total	%	Total	%
Try New Things	30	18.8%	18	11.3%	44	27.5%	23	14.4%	45	28.1%
Discuss CPD Needs for Use of Digital Technology	24	15.0%	23	14.4%	49	30.6%	22	13.8%	42	26.3%
Share experiences	30	18.8%	28	17.5%	41	25.6%	20	12.5%	41	25.6%

CPD for Digital Technology Skills Development

Table 46: CPD Courses Attended on the Pedagogical use of Digital Technologies by Gender

CPD Course Type	Female	% Female	Male	% Male	Total	% Total
Face-to-face courses, seminars, or conferences outside of school	14	37.8%	54	43.9%	68	42.5%
School-based mentoring or coaching, as a part of a formal school arrangement	12	32.4%	46	37.4%	58	36.3%
Learning from other teachers within the school through online or offline collaboration	8	21.6%	32	26.0%	40	25.0%
Online courses, webinars, or online conferences	8	21.6%	32	26.0%	40	25.0%
Other in-house training sessions organized by the school	7	18.9%	20	16.3%	27	16.9%
Learning from other teachers through online teachers' networks or communities of practice	6	16.2%	18	14.6%	24	15.0%
Other	6	16.2%	16	13.0%	22	13.8%
Study visits (to other schools, businesses, or organizations)	3	8.1%	9	7.3%	12	7.5%
Accredited programs (short, accredited courses, degree programs)	0	0.0%	9	7.3%	9	5.6%
Total Teachers	37		123		160	

Section 2. B. Digital Literacy Assessment

Digital Literacy Assessment Score

Table 47: Digital Literacy Assessment Scores

Score out of 100	Total	Female	Male	<30	30-35	>35	ICT	Math	Physics	Government Aided	Private	Public
10-19	4%	5%	3%	0%	1%	14%	4%	3%	3%	4%	0%	5%
20-29	6%	0%	7%	0%	7%	8%	2%	10%	9%	7%	0%	5%
30-39	11%	14%	10%	0%	16%	8%	4%	8%	9%	7%	11%	13%
40-49	8%	16%	6%	8%	9%	8%	2%	8%	6%	9%	5%	9%
50-59	9%	8%	9%	3%	10%	11%	5%	8%	11%	9%	5%	9%
60-69	11%	24%	7%	5%	10%	14%	7%	8%	9%	11%	16%	9%
70-79	15%	14%	15%	24%	15%	5%	19%	24%	11%	11%	0%	21%
80-89	8%	0%	11%	11%	8%	5%	11%	3%	9%	6%	16%	8%
90-100	29%	19%	33%	49%	22%	27%	47%	25%	34%	35%	47%	22%

Table 48: Digital Literacy Competency Scores by Subject

Competency 0.2: Software Operations	
Internet	3.2
Word	3.0
Excel	2.5
PowerPoint	2.3

Table 49: Competency 2: Communication and Collaboration Average Score by Content

Competency 2: Communication and Collaboration	
E-mail	3.0
Moodle	1.7

1.2 Scratch Data

Section 3. A. Coding/ Scratch Competences

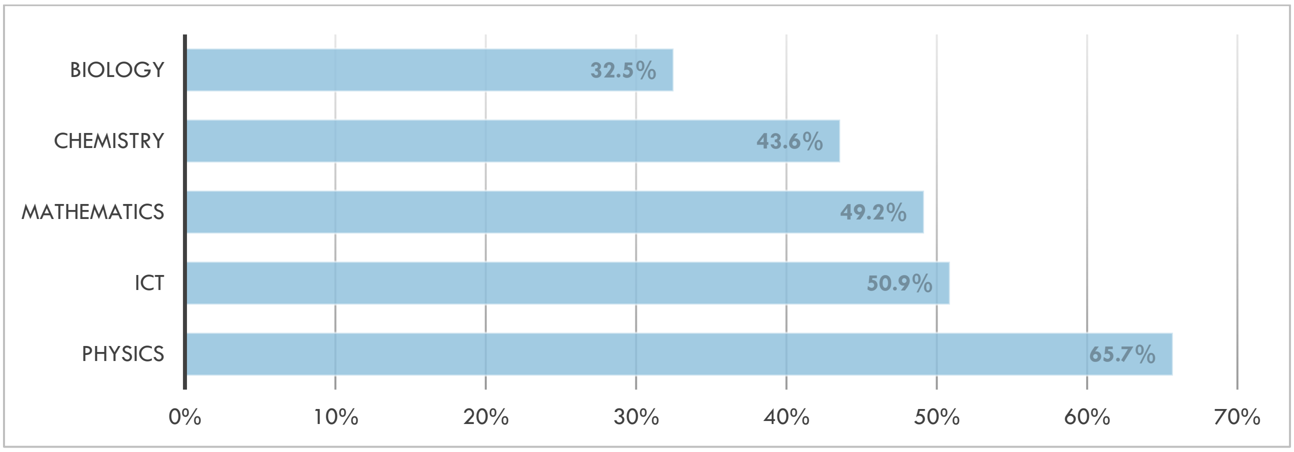

Figure 38: Percent of Teachers Surveyed by Subject Who Report Having Used Scratch

Table 50: Teacher Agreement with the Statement "I enjoy coding using Scratch" (out of those reporting using Scratch previously)

I enjoy coding using Scratch	Total	Total %	Female	Female %	Male	Male %
Strongly Agree	15	19.5%	2	13.3%	13	21.0%
Agree	24	31.2%	6	40.0%	18	29.0%
Neither agree nor disagree	14	18.2%	1	6.7%	13	21.0%
Disagree	12	15.6%	5	33.3%	7	11.3%

Strongly disagree	12	15.6%	1	6.7%	11	17.7%
Total	77		15		62	

Section 3. B. Scratch Knowledge

Table 51: Scratch Skills Assessment (score out of 34 points)

Score out of 34	Total	Female	Male	<30	30-35	>35	ICT	Math	Physics	Government Aided	Private	Public
0	38%	43%	36%	38%	36%	41%	28%	34%	31%	41%	11%	41%
1-5	37%	38%	37%	35%	36%	41%	37%	37%	31%	43%	32%	34%
6-10	18%	16%	18%	14%	21%	14%	25%	19%	14%	7%	32%	21%
>11	8%	3%	10%	14%	7%	5%	11%	10%	23%	9%	26%	3%

Section 3. C. Access to Coding/Scratch Support

Table 52: Access to Scratch/ Coding Support Assessment (score out of 12 points)

Score out of 12	Total	Female	Male	<30	30-35	>35	ICT	Math	Physics	Government Aided	Private	Public
0	66%	68%	65%	49%	69%	76%	56%	63%	54%	74%	37%	67%
1-5	17%	22%	15%	30%	16%	5%	23%	19%	17%	13%	32%	16%
>6	18%	11%	20%	22%	15%	19%	21%	19%	29%	13%	32%	17%

1.3 School Clubs Data

Section 4. A. Enabling Environment for School Clubs

Table 53: Frequency of School Clubs

Reported Frequency	% of Teachers
More than 1 time per week	33%
Weekly	51%
Every 2 weeks	3%
Monthly	4%
Other	9%

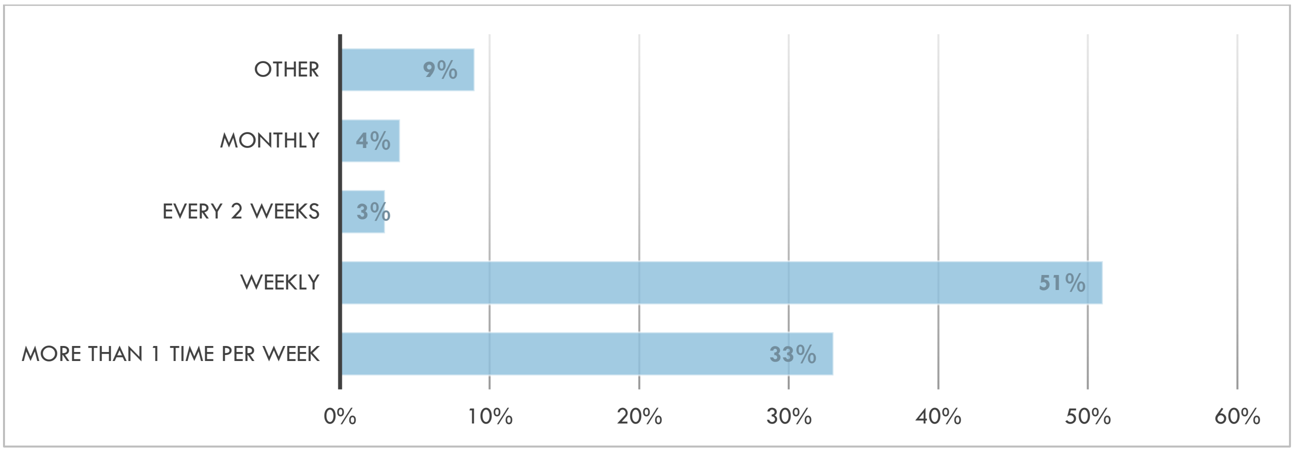

Figure 39: Frequency of School Clubs

Table 54: Duration of School Clubs

Reported Duration	% of Teachers
Less than 1 hour	30%
1 hour	41%
1-2 hours	23%
More than 2 hours	6%

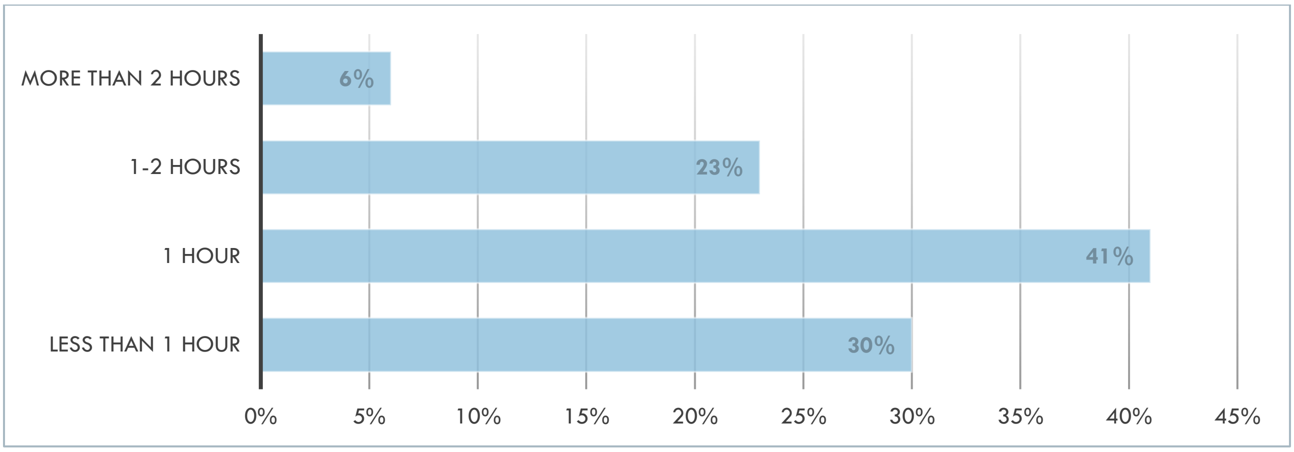

Figure 40: Duration of School Clubs

Table 55: Club Participation Assessment

Club participation	Always	Very Often	Sometimes	Rarely	Never
Students actively participate in clubs	32.0%	17.0%	38.0%	9.0%	4.0%
Students participate in STEM/ICT clubs	30.0%	15.0%	32.5%	10.0%	12.5%
Boys and girls participate equally in clubs	26.0%	50.0%	3.0%	10.0%	11.0%

Section 3. B. School Club Practices

Table 56: Percent of Teachers that report leading a school club by subject

	Teaching Subject				
	ICT	Physics	Mathematics	Chemistry	Biology
Leads a STEM/ICT Club	19.3%	20.0%	20.3%	17.9%	17.5%

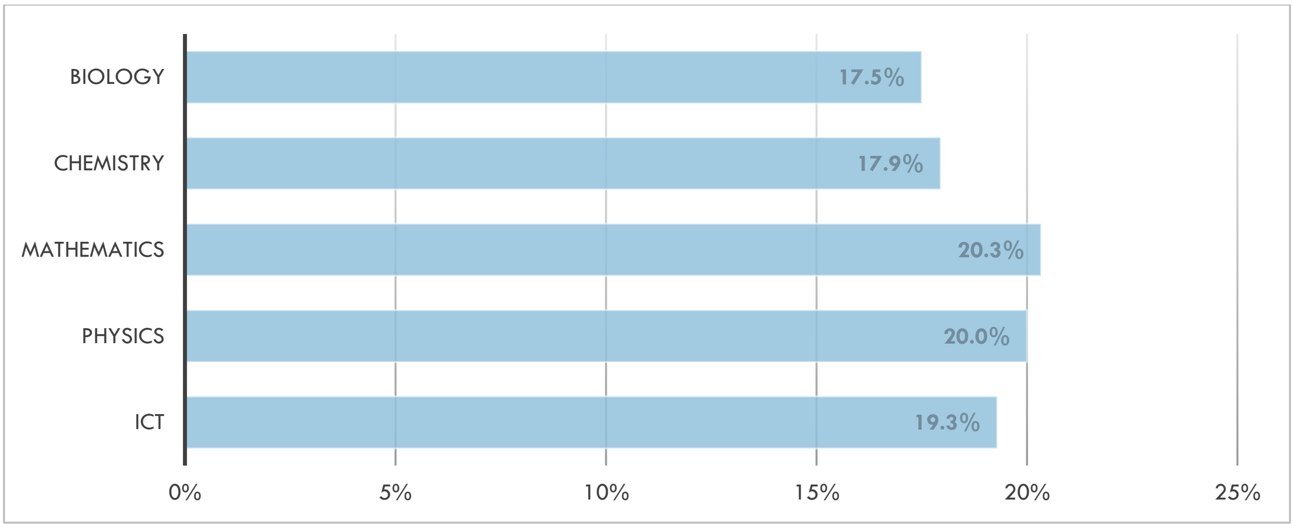

Figure 41: Teachers reporting leading clubs by subject

Table 57: School Club Leadership Skills Assessment (Score out of 12 points)

Score out of 12	Total	Female	Male	<30	30-35	>35	ICT	Math	Physics	Government Aided	Private	Public
0	64%	70%	62%	59%	60%	76%	68%	63%	54%	59%	47%	70%
1-5	4%	3%	5%	3%	7%	0%	2%	3%	0%	4%	0%	6%
>6	32%	27%	33%	38%	33%	24%	30%	34%	46%	37%	53%	24%

Table 58: Level of Agreement with School Club Leadership Assessment Questions

Club Leadership Skills	Strongly Agree	Agree	Neither agree nor disagree/ Not applicable	Disagree	Strongly disagree
I actively encourage girls to join STEM/ICT clubs	28.36%	35.82%	14.93%	7.46%	13.43%
I give students roles in the club	29.85%	37.31%	16.42%	5.97%	10.45%
I let students decide on the activities in the club	31.34%	41.79%	14.93%	4.48%	7.46%

Section 4. C. Self-Efficacy to Lead Clubs

Table 59: School Club Leadership Self-Efficacy Assessment (Score out of 20 points)

Score out of 20	Total	Female	Male	<30	30-35	>35	ICT	Math	Physics	Government Aided	Private	Public
0	49%	62%	46%	38%	45%	70%	47%	44%	43%	59%	37%	46%
1-5	11%	8%	12%	22%	8%	8%	9%	17%	17%	9%	21%	10%
6-10	9%	8%	9%	8%	9%	8%	2%	8%	9%	4%	11%	11%
>11	31%	22%	33%	32%	37%	14%	42%	31%	31%	28%	32%	32%

Table 60: Level of Agreement with Club Leadership Self-Efficacy Statements

Self-Efficacy Statements	Completely Confident	Moderately Confident	Somewhat Confident	Slightly Confident	Not at all Confident
I can lead a scratch club at my school	17.5%	10.6%	7.5%	6.3%	58.1%
I can motivate kids to join a scratch school club	23.1%	10.0%	6.9%	7.5%	52.5%
I can set learning targets	18.1%	8.8%	8.8%	10.6%	53.8%
I can develop an agenda	16.9%	10.0%	8.8%	8.8%	55.0%
I can evaluate scratch club achievements	18.1%	11.9%	6.9%	8.1%	55.0%

1.5 Scratch/ Coding in the Classroom

Section 5. A. Attitudes about Scratch/Coding in the Classroom

Table 61: Teacher Attitudes on use of Scratch in the Classroom (score out of 12 points)

Score out of 12	Total	Female	Male	<30	30-35	>35	ICT	Math	Physics	Government Aided	Private	Public
0	22%	16%	24%	5%	24%	32%	16%	22%	29%	26%	0%	24%
1-5	14%	24%	11%	16%	13%	14%	14%	12%	6%	13%	5%	16%
6-10	38%	35%	38%	46%	36%	32%	33%	41%	46%	41%	58%	31%
>11	27%	24%	28%	32%	27%	22%	37%	25%	20%	20%	37%	29%

Table 62: Level of Agreement with Statements on Use of Digital Technology and Coding in the Classroom

Classroom Coding Attitude Statements	Strongly Agree	Agree	Neither Agree Nor Disagree/ Never Used Scratch	Disagree	Strongly Disagree
Use of digital technologies in lessons is not important	9.4%	5.0%	13.8%	18.8%	53.1%
Boys are naturally better at coding	9.4%	10.0%	16.9%	18.8%	45.0%
Both boys and girls can benefit from learning how to code	28.8%	25.6%	15.0%	8.1%	22.5%
Coding can help to teach how to solve problems	28.8%	22.5%	13.8%	7.5%	27.5%
Coding can help students better understand career options	28.1%	23.8%	11.9%	8.1%	28.1%

Section 5. B. Practices around Scratch/Coding in the Classroom

Table 63: Teacher Use of Scratch/ Digital Technologies in the Classroom (score out of 36 points)

Score out of 36	Total	Female	Male	<30	30-35	>35	ICT	Math	Physics	Government Aided	Private	Public
0	18%	22%	16%	3%	19%	30%	12%	12%	14%	17%	0%	22%
1-10	30%	35%	28%	30%	29%	32%	33%	24%	20%	35%	21%	29%
11-20	23%	24%	22%	32%	21%	16%	19%	24%	17%	20%	32%	22%
21-30	21%	16%	22%	27%	20%	16%	23%	32%	43%	26%	37%	14%
>31	9%	3%	11%	8%	12%	5%	12%	8%	6%	2%	11%	14%

Table 64: Level of Agreement on Practices Around the Use of Coding in the Classroom

Classroom Coding Practice Statements	Strongly Agree	Agree	Neither Agree Nor Disagree/ Never Used Scratch	Disagree	Strongly Disagree
I set digital learning activities that engage my students	13.1%	28.8%	14.4%	20.0%	23.8%
I incorporate digital technologies/Scratch into my lesson plans	9.4%	21.3%	14.4%	19.4%	35.6%
I use digital technologies/Scratch to tailor to specific students' individual needs	10.0%	16.9%	11.9%	23.1%	38.1%
I use digital technologies/Scratch to encourage students to identify and solve problems	9.4%	16.9%	13.8%	27.5%	32.5%
I use digital technologies/Scratch to facilitate student collaboration	11.9%	17.5%	11.9%	23.8%	35.0%
I use digital technologies/Scratch to foster students' creativity	10.6%	18.8%	8.8%	23.8%	38.1%
I teach students how to behave safely online	19.4%	22.5%	9.4%	18.8%	30.0%
I teach students how to give credit to others' work	16.9%	20.6%	11.9%	21.9%	28.8%
When students have questions, I direct them to online/offline resources	12.5%	18.8%	13.1%	23.8%	31.9%

Section 5. C. Self-Efficacy for Coding in the Classroom

Table 65: Teacher Self-Efficacy for Use of Scratch/ Coding in the Classroom (score out of 12 points)

Score out of 12	Total	Female	Male	<30	30-35	>35	ICT	Math	Physics	Government Aided	Private	Public
0	40%	46%	38%	27%	40%	54%	32%	34%	29%	46%	5%	44%
1-5	28%	30%	27%	32%	26%	27%	33%	24%	26%	28%	26%	28%
6-10	28%	24%	29%	38%	28%	19%	30%	41%	40%	26%	58%	23%
>11	4%	0%	6%	3%	7%	0%	5%	2%	6%	0%	11%	6%

Table 66: Level of Agreement on Self-Efficacy Assessment Questions on the Use of Coding in the Classroom

Self-Efficacy for Coding in the Classroom Statements	Strongly Agree	Agree	Neither Agree Nor Disagree/ Never Used Scratch	Disagree	Strongly Disagree
I have the skills to incorporate scratch into my lesson plans	6.3%	15.6%	11.3%	22.5%	44.4%
My school leaders support me to use Scratch/digital technologies in my lessons	7.5%	14.4%	10.6%	24.4%	43.1%
Teachers at my school talk about using digital technologies in the classroom	7.5%	18.1%	9.4%	23.1%	41.9%

Annex 2: Index Calculations and Correlation Checks

2. A. School Environment Score

Out of 36 points

Survey Question	Scoring	Included in Final Calculation?
2.A.1. Does your school have electricity?	1. Never (0 points) 2. Rarely (1 point) 3. Sometimes (2 points) 4. Very Often (3 points) 5. Always (4 points)	Included (total possible 4 points)
2.A.2. Are there digital devices available to you at school to use when teaching?	1. Never (0 points) 2. Rarely (1 point) 3. Sometimes (2 points) 4. Very Often (3 points) 5. Always (4 points)	Included (total possible 4 points)
2.A.3.At school, do you have access to the Internet for teaching and learning?	1. Never (0 points) 2. Rarely (1 point) 3. Sometimes (2 points) 4. Very Often (3 points) 5. Always (4 points)	Included (total possible 4 points)
2.A.4. Is there technical support available at the school in case of problems with digital technologies?	1. Never (0 points) 2. Rarely (1 point) 3. Sometimes (2 points) 4. Very Often (3 points) 5. Always (4 points)	Included (total possible 4 points)
2.A.5. Are there school owned/ managed computers (either desktops or laptops) available for students to use when they need them?	1. Never (0 points) 2. Rarely (1 point) 3. Sometimes (2 points) 4. Very Often (3 points) 5. Always (4 points)	Included (total possible 4 points)
2.A.6.Does your school have any Smart Classrooms?	1. Yes, sufficient (4 points) 2. Yes, but not sufficient (2 points) 3. No (0 points) 98. Don't know (0 points)	Included (total possible 4 points)

2A.7. Do students in need of special support have access to assistive devices for use with technology such as text to speech, voice recognition, alternative key boards, etc.	1. Never (0 points) 2. Rarely (1 point) 3. Sometimes (2 points) 4. Very Often (3 points) 5. Always (4 points)	Not correlated (see Correlation Analysis table below)
2.A.8. Do school leaders support you to try out new ways of teaching using digital technologies?	1. Never (0 points) 2. Rarely (1 point) 3. Sometimes (2 points) 4. Very Often (3 points) 5. Always (4 points)	Included (total possible 4 points)
2.A.9. Do school leaders discuss with you your CPD needs for teaching with digital technologies?	1. Never (0 points) 2. Rarely (1 point) 3. Sometimes (2 points) 4. Very Often (3 points) 5. Always (4 points)	Included (total possible 4 points)
2.A.10. Do school leaders support you to share experiences within the school (with other teachers) about teaching with digital technologies?	1. Never (0 points) 2. Rarely (1 point) 3. Sometimes (2 points) 4. Very Often (3 points) 5. Always (4 points)	Included (total possible 4 points)

Correlation Analysis

	2.A.1	2.A.2	2.A.3	2.A.4	2.A.5	2.A.6	2.A.7	2.A.8	2.A.9	2.A.10	% correlation
2.A.1	100%	55%	48%	46%	57%	43%	18%	39%	30%	31%	41%
2.A.2	55%	100%	80%	65%	84%	61%	32%	65%	54%	48%	61%
2.A.3	48%	80%	100%	76%	75%	53%	34%	64%	48%	50%	59%
2.A.4	46%	65%	76%	100%	67%	44%	29%	66%	49%	51%	55%
2.A.5	57%	84%	75%	67%	100%	64%	36%	65%	50%	45%	60%
2.A.6	43%	61%	53%	44%	64%	100%	23%	47%	34%	29%	44%
2.A.7	18%	32%	34%	29%	36%	23%	100%	38%	32%	36%	31%
2.A.8	39%	65%	64%	66%	65%	47%	38%	100%	67%	72%	58%
2.A.9	30%	54%	48%	49%	50%	34%	32%	67%	100%	73%	49%
2.A.10	31%	48%	50%	51%	45%	29%	36%	72%	73%	100%	48%

2. B. Digital Literacy: Self-Assessment Competencies 0, 1, 2, 4, 6

Out of 100 points

Survey Question	Scoring	Competency	Included in Final Calculation?
Competency 0.1: Devices Operations			
2.B.1.a Keyboard	Correct Identification = 1 point	DIGITAL LITERACY Competency 0: Devices and software operations (0.1)	Included (total possible 1 point). *For comparison with other competencies, converted section 0.1 to a 4 pt. scale, so, each of the 8 questions worth .5 points)*
2.B.1.b. Mouse	Correct Identification = 1 point	DIGITAL LITERACY Competency 0: Devices and software operations (0.1)	Included (total possible 1 point)
2.B.1.c. Monitor	Correct Identification = 1 point	DIGITAL LITERACY Competency 0: Devices and software operations (0.1)	Included (total possible 1 point)
2.B.1.d. Power cable	Correct Identification = 1 point	DIGITAL LITERACY Competency 0: Devices and software operations (0.1)	Included (total possible 1 point)
2.B.1.e. Printer	Correct Identification = 1 point	DIGITAL LITERACY Competency 0: Devices and software operations (0.1)	Included (total possible 1 point)
2.B.1.f. Ethernet port	Correct Identification = 1 point	DIGITAL LITERACY Competency 0: Devices and software operations (0.1)	Included (total possible 1 point)
2.B.1.g. Cursor	Correct Identification = 1 point	DIGITAL LITERACY Competency 0: Devices and software operations (0.1)	Included (total possible 1 point)
2.B.1.h. USB port	Correct Identification = 1 point	DIGITAL LITERACY Competency 0: Devices and software operations (0.1)	Included (total possible 1 point)
Competency 0.2: Software Operations			
2.B.2. I can perform the following basic edits in Word: bold, italics, underline, spell checks and grammar checks.	1. Not at all confident (0 points) 2. Slightly confident (1 point) 3. Somewhat confident (2 points) 4. Moderately confident (3 points) 5. Completely confident (4 points)	DIGITAL LITERACY Competency 0: Devices and software operations (0.2)	Included (total possible 4 points)
2.B.3. I can perform the following formatting in Word: change font size and type, adjust margins, justify, and indent text.	1. Not at all confident (0 points) 2. Slightly confident (1 point) 3. Somewhat confident (2 points) 4. Moderately confident (3 points) 5. Completely confident (4 points)	DIGITAL LITERACY Competency 0: Devices and software operations (0.2)	Included (total possible 4 points)
2.B.4. I can insert images and tables into a Word document.	1. Not at all confident (0 points) 2. Slightly confident (1 point) 3. Somewhat confident (2 points) 4. Moderately confident (3 points) 5. Completely confident (4 points)	DIGITAL LITERACY Competency 0: Devices and software operations (0.2)	Included (total possible 4 points)
2.B.5. I can develop a presentation in PowerPoint.	1. Not at all confident (0 points) 2. Slightly confident (1 point)	DIGITAL LITERACY Competency 0: Devices and software operations (0.2)	Included (total possible 4 points)

	3. Somewhat confident (2 points) 4. Moderately confident (3 points) 5. Completely confident (4 points)		
2.B.6. I can create and format a table in Excel.	1. Not at all confident (0 points) 2. Slightly confident (1 point) 3. Somewhat confident (2 points) 4. Moderately confident (3 points) 5. Completely confident (4 points)	DIGITAL LITERACY Competency 0: Devices and software operations (0.2)	Included (total possible 4 points)
2.B.7. I can use a formula in excel to calculate a sum.	1. Not at all confident (0 points) 2. Slightly confident (1 point) 3. Somewhat confident (2 points) 4. Moderately confident (3 points) 5. Completely confident (4 points)	DIGITAL LITERACY Competency 0: Devices and software operations (0.2)	Included (total possible 4 points)
2.B.8. I can connect my computer to the internet using wifi.	1. Not at all confident (0 points) 2. Slightly confident (1 point) 3. Somewhat confident (2 points) 4. Moderately confident (3 points) 5. Completely confident (4 points)	DIGITAL LITERACY Competency 0: Devices and software operations (0.2)	Included (total possible 4 points)
2.B.9. I know how to open a browser on the internet.	1. Not at all confident (0 points) 2. Slightly confident (1 point) 3. Somewhat confident (2 points) 4. Moderately confident (3 points) 5. Completely confident (4 points)	DIGITAL LITERACY Competency 0: Devices and software operations (0.2)	Included (total possible 4 points)
Competency 1: Information and Data Literacy			
2.B.10. I know how to use a search engine to find information and resources on the internet.	1. Not at all confident (0 points) 2. Slightly confident (1 point) 3. Somewhat confident (2 points) 4. Moderately confident (3 points) 5. Completely confident (4 points)	DIGITAL LITERACY Competency 1: Information and Data Literacy (1.1)	Included (total possible 4 points)
2.B.11. I can download and install applications from the internet on my computer	1. Not at all confident (0 points) 2. Slightly confident (1 point) 3. Somewhat confident (2 points) 4. Moderately confident (3 points) 5. Completely confident (4 points)	DIGITAL LITERACY Competency 1: Information and Data Literacy (1.3)	Included (total possible 4 points)
2.B.12. I know how to evaluate the quality and validity of the source of information obtained from web-based resources.	1. Not at all confident (0 points) 2. Slightly confident (1 point) 3. Somewhat confident (2 points) 4. Moderately confident (3 points) 5. Completely confident (4 points)	DIGITAL LITERACY Competency 1: Information and Data Literacy (1.2)	Included (total possible 4 points)
Competency 2: Communication and Collaboration			
2.B.13. I can compose and send an email.	1. Not at all confident (0 points) 2. Slightly confident (1 point) 3. Somewhat confident (2 points)	DIGITAL LITERACY Competency 2: Communication and Collaboration (2.1)	Included (total possible 4 points)

	4. Moderately confident (3 points) 5. Completely confident (4 points)		
2.B.14. I can reply to or forward an email.	1. Not at all confident (0 points) 2. Slightly confident (1 point) 3. Somewhat confident (2 points) 4. Moderately confident (3 points) 5. Completely confident (4 points)	DIGITAL LITERACY Competency 2: Communication and Collaboration (2.1)	Included (total possible 4 points)
2.B.15. I can use digital technology (email, etc.) for school-related communication.	1. Not at all confident (0 points) 2. Slightly confident (1 point) 3. Somewhat confident (2 points) 4. Moderately confident (3 points) 5. Completely confident (4 points)	DIGITAL LITERACY Competency 2: Communication and Collaboration (2.2)	Included (total possible 4 points)
2.B.16. I can post or reply to a message in the Moodle forum.	1. Not at all confident (0 points) 2. Slightly confident (1 point) 3. Somewhat confident (2 points) 4. Moderately confident (3 points) 5. Completely confident (4 points)	DIGITAL LITERACY Competency 2: Communication and Collaboration (2.2)	Included: Moodle Questions less correlated
2.B.17. I can upload a document in Moodle.	1. Not at all confident (0 points) 2. Slightly confident (1 point) 3. Somewhat confident (2 points) 4. Moderately confident (3 points) 5. Completely confident (4 points)	DIGITAL LITERACY Competency 2: Communication and Collaboration (2.2)	Included: Moodle Questions less correlated
Competency 4: Safety			
2.B.18. I can download and install a free anti-virus software program.	1. Not at all confident (0 points) 2. Slightly confident (1 point) 3. Somewhat confident (2 points) 4. Moderately confident (3 points) 5. Completely confident (4 points)	DIGITAL LITERACY Competency 4: Safety (4.1)	Included (total possible 4 points)
2.B.19. I can ensure the privacy of my personal information when using digital technology.	1. Not at all confident (0 points) 2. Slightly confident (1 point) 3. Somewhat confident (2 points) 4. Moderately confident (3 points) 5. Completely confident (4 points)	DIGITAL LITERACY Competency 4: Safety (4.2)	Included (total possible 4 points)
2.B.20. I know when I should and shouldn't share information when online.	1. Not at all confident (0 points) 2. Slightly confident (1 point) 3. Somewhat confident (2 points) 4. Moderately confident (3 points) 5. Completely confident (4 points)	DIGITAL LITERACY Competency 4: Safety (4.2)	Included (total possible 4 points)
2.B.21. I can keep school related digital data secure.	1. Not at all confident (0 points) 2. Slightly confident (1 point) 3. Somewhat confident (2 points) 4. Moderately confident (3 points) 5. Completely confident (4 points)	DIGITAL LITERACY Competency 4: Safety (4.2)	Included (total possible 4 points)

Competency 6: Career Related Competences			
2.B.22. I can use digital resources to support my teaching in the classroom.	1. Not at all confident (0 points) 2. Slightly confident (1 point) 3. Somewhat confident (2 points) 4. Moderately confident (3 points) 5. Completely confident (4 points)	DIGITAL LITERACY Competency 6: Career-Related Competences (6.1)	Included (total possible 4 points)
2.B.23. I can search online for digital educational resources.	1. Not at all confident (0 points) 2. Slightly confident (1 point) 3. Somewhat confident (2 points) 4. Moderately confident (3 points) 5. Completely confident (4 points)	DIGITAL LITERACY Competency 6: Career-Related Competences (6.1)	Included (total possible 4 points)
2.B.24. I can use digital resources to develop educational material for use in the classroom.	1. Not at all confident (0 points) 2. Slightly confident (1 point) 3. Somewhat confident (2 points) 4. Moderately confident (3 points) 5. Completely confident (4 points)	DIGITAL LITERACY Competency 6: Career-Related Competences (6.1)	Included (total possible 4 points)

Correlation Analysis

	2.B.2	2.B.3	2.B.4	2.B.5	2.B.6	2.B.7	2.B.8	2.B.9	2.B.10	2.B.11	2.B.12	2.B.13	2.B.14	2.B.15	2.B.16	2.B.17	2.B.18	2.B.19	2.B.20	2.B.21	2.B.22	2.B.23	2.B.24	
2.B.2	100%	77%	74%	55%	64%	60%	62%	60%	61%	53%	48%	57%	68%	58%	30%	32%	46%	47%	49%	40%	48%	48%	45%	51%
2.B.3	77%	100%	75%	63%	66%	68%	58%	53%	59%	54%	53%	53%	66%	56%	43%	46%	58%	56%	52%	50%	50%	45%	46%	54%
2.B.4	74%	75%	100%	62%	66%	61%	64%	54%	56%	61%	56%	69%	78%	60%	35%	44%	58%	55%	55%	51%	57%	50%	51%	56%
2.B.5	55%	63%	62%	100%	74%	69%	54%	50%	52%	60%	62%	47%	54%	59%	52%	58%	69%	74%	62%	65%	64%	52%	65%	57%
2.B.6	64%	66%	66%	74%	100%	79%	56%	55%	56%	58%	61%	55%	62%	64%	46%	46%	54%	63%	58%	57%	49%	49%	52%	56%
2.B.7	60%	68%	61%	69%	79%	100%	53%	57%	63%	61%	62%	52%	60%	61%	48%	51%	65%	68%	59%	57%	49%	46%	48%	56%
2.B.8	62%	58%	64%	54%	56%	53%	100%	75%	66%	65%	43%	46%	60%	52%	36%	37%	50%	52%	54%	47%	56%	56%	54%	52%
2.B.9	60%	53%	54%	50%	55%	57%	75%	100%	78%	66%	52%	52%	59%	63%	41%	43%	50%	51%	54%	49%	56%	52%	54%	53%
2.B.10	61%	59%	56%	52%	56%	63%	66%	78%	100%	69%	62%	58%	66%	68%	43%	45%	51%	59%	62%	58%	56%	59%	58%	57%
2.B.11	53%	54%	61%	60%	58%	61%	65%	66%	69%	100%	67%	58%	61%	73%	55%	53%	66%	67%	73%	65%	64%	63%	69%	60%
2.B.12	48%	53%	56%	62%	61%	62%	43%	52%	62%	67%	100%	55%	57%	72%	52%	52%	57%	74%	73%	69%	63%	59%	69%	57%
2.B.13	57%	53%	69%	47%	55%	52%	46%	52%	58%	58%	55%	100%	90%	72%	38%	37%	48%	50%	59%	49%	58%	56%	58%	53%
2.B.14	68%	66%	78%	54%	62%	60%	60%	59%	66%	61%	57%	90%	100%	75%	39%	40%	52%	53%	58%	51%	62%	61%	58%	58%
2.B.15	58%	56%	60%	59%	64%	61%	52%	63%	68%	73%	72%	72%	75%	100%	54%	47%	55%	60%	68%	63%	62%	61%	66%	59%
2.B.16	30%	43%	35%	52%	46%	48%	36%	41%	43%	55%	52%	38%	39%	54%	100%	90%	66%	66%	57%	56%	51%	50%	52%	48%
2.B.17	32%	46%	44%	58%	46%	51%	37%	43%	45%	53%	52%	37%	40%	47%	90%	100%	66%	69%	55%	60%	53%	49%	54%	49%
2.B.18	46%	58%	58%	69%	54%	65%	50%	50%	51%	66%	57%	48%	52%	55%	66%	66%	100%	78%	63%	61%	61%	56%	57%	56%
2.B.19	47%	56%	55%	74%	63%	68%	52%	51%	59%	67%	74%	50%	53%	60%	66%	69%	78%	100%	77%	80%	72%	62%	70%	61%
2.B.20	49%	52%	55%	62%	58%	59%	54%	54%	62%	73%	73%	59%	58%	68%	57%	55%	63%	77%	100%	78%	71%	64%	72%	60%
2.B.21	40%	50%	51%	65%	57%	57%	47%	49%	58%	65%	69%	49%	51%	63%	56%	60%	61%	80%	78%	100%	77%	66%	75%	58%
2.B.22	48%	50%	57%	64%	49%	49%	56%	56%	56%	64%	63%	58%	62%	62%	51%	53%	61%	72%	71%	77%	100%	79%	80%	58%
2.B.23	48%	45%	50%	52%	49%	46%	56%	52%	59%	63%	59%	56%	61%	61%	50%	49%	56%	62%	64%	66%	79%	100%	76%	55%
2.B.24	45%	46%	51%	65%	52%	48%	54%	54%	58%	69%	69%	58%	58%	66%	52%	54%	57%	70%	72%	75%	80%	76%	100%	58%

3. A. Coding/ Scratch Competences (Digital Literacy Competencies 3 and 5)

Survey Question	Scoring	Competency	Included in Final Calculation?
3.A.1. I can code using at least one coding language (Python, Java scripts, Scratch etc.)	1. Not at all confident (0 points) 2. Slightly confident (1 point) 3. Somewhat confident (2 points) 4. Moderately confident (3 points) 5. Completely confident (4 points)	DIGITAL LITERACY Competency 3: Digital Content Creation (3.4)	Included (total possible 4 points)
3.A.2. I can explain the basic concepts of coding in scratch	1. Not at all confident (0 points) 2. Slightly confident (1 point) 3. Somewhat confident (2 points) 4. Moderately confident (3 points) 5. Completely confident (4 points)	**Expected Competency:** Having the digital literacy skills and technical competences to explain basic concepts of coding in Scratch DIGITAL LITERACY Competency 3: Digital Content Creation (3.4)	Included (total possible 4 points)
3.A.3. I can develop stories or animations in Scratch.	1. Not at all confident (0 points) 2. Slightly confident (1 point) 3. Somewhat confident (2 points) 4. Moderately confident (3 points) 5. Completely confident (4 points)	DIGITAL LITERACY Competency 3: Digital Content Creation (3.4)	Included (total possible 4 points)
3.A.4. I can develop simple games in Scratch.	1. Not at all confident (0 points) 2. Slightly confident (1 point) 3. Somewhat confident (2 points) 4. Moderately confident (3 points) 5. Completely confident (4 points)	DIGITAL LITERACY Competency 3: Digital Content Creation (3.4)	Included (total possible 4 points)
3.A.5. I can apply mathematical concepts in Scratch (for example: drawing a polygon or solving a multiplication problem).	1. Not at all confident (0 points) 2. Slightly confident (1 point) 3. Somewhat confident (2 points) 4. Moderately confident (3 points) 5. Completely confident (4 points)	DIGITAL LITERACY Competency 3: Digital Content Creation (3.4)	Included (total possible 4 points)
3.A.6. I can experiment and iterate (or develop bit by bit) in Scratch.	1. Not at all confident (0 points) 2. Slightly confident (1 point) 3. Somewhat confident (2 points) 4. Moderately confident (3 points) 5. Completely confident (4 points)	Computational Thinking DIGITAL LITERACY Competency 5: Problem Solving (5.5)	Included (total possible 4 points)
3.A.7. I can test and debug (or find and solve problems) in Scratch.	1. Not at all confident (0 points) 2. Slightly confident (1 point) 3. Somewhat confident (2 points) 4. Moderately confident (3 points) 5. Completely confident (4 points)	Computational Thinking DIGITAL LITERACY Competency 5: Problem Solving (5.5)	Included (total possible 4 points)
3.A.8. I can reuse and remix (or building on existing projects) in Scratch.	1. Not at all confident (0 points) 2. Slightly confident (1 point) 3. Somewhat confident (2 points)	Computational Thinking DIGITAL LITERACY Competency 5: Problem Solving (5.5)	Included (total possible 4 points)

	4. Moderately confident (3 points) 5. Completely confident (4 points)		
3.A.9. I can abstract and modularize (or explore connections between the whole and parts) in Scratch.	1. Not at all confident (0 points) 2. Slightly confident (1 point) 3. Somewhat confident (2 points) 4. Moderately confident (3 points) 5. Completely confident (4 points)	Computational Thinking DIGITAL LITERACY Competency 5: Problem Solving (5.5)	Included (total possible 4 points)
3.A.10. I enjoy coding using Scratch.	1. Strongly disagree (0 points) 2. Disagree (1 point) 3. Neither agree nor disagree (2 points) 4. Agree (3 points) 5. Strongly agree (4 points) 6. I have never used scratch (0 points)	ATTITUDE: Enjoyment of using scratch might be a predictor of Practices.	Excluded from Score: Attitude. Assessed as standalone measure Also used to assess those with prior experience with Scratch

Correlation Analysis

	3.A.1	3.A.2	3.A.3	3.A.4	3.A.5	3.A.6	3.A.7	3.A.8	3.A.9	
3.A.1	100%	74%	73%	70%	67%	56%	62%	62%	56%	58%
3.A.2	74%	100%	91%	85%	80%	75%	82%	77%	72%	71%
3.A.3	73%	91%	100%	88%	83%	79%	85%	82%	75%	73%
3.A.4	70%	85%	88%	100%	84%	86%	84%	85%	77%	73%
3.A.5	67%	80%	83%	84%	100%	85%	88%	81%	77%	72%
3.A.6	56%	75%	79%	86%	85%	100%	88%	84%	80%	70%
3.A.7	62%	82%	85%	84%	88%	88%	100%	84%	82%	73%
3.A.8	62%	77%	82%	85%	81%	84%	84%	100%	91%	72%
3.A.9	56%	72%	75%	77%	77%	80%	82%	91%	100%	68%

Question 3.A.1 was less correlated than other questions.

3. B. Scratch Skills Assessment (Knowledge)

Survey Question	Scoring	Competency	Included in Final Calculation?
3.B.1. In Scratch what is a sprite?	2. An element or character to use in a story (1 point)	Sprites Module 1, Lesson 1: Overview of Scratch Interface Elements	All included
3.B.2. Match the computational concept.	Each correct response is worth 1 point	Computational Concepts (from Scratched.gse.harvard)	
3.B.2.a. Running the same sequence multiple times	2. Loops		
3.B.2.b. One thing causing another thing to happen	4. Events		

3.B.2.c. Making decision based on conditions	5. Conditionals		
3.B.2.d. Identifying a series of steps for a task	1. Sequence		
3.B.2.e. Making things happen at the same time	3. Parallelism		
3.B.3 to 3.B.10. Match the strategy to the computational practice.	Each correct response is worth 1 point	Computational Practices (from Scratched.gse.harvard)	
3.B.3. Decide what scripts are needed for your project and what they should do	4. Abstracting and modularizing		
3.B.4. Read through the scripts to investigate the cause of the problem	1. Testing and debugging		
3.B.5. Try things out as you go	3. Experimenting and iterating		
3.B.6. Try new ways to do things or try new things	3. Experimenting and iterating		
3.B.7. Find ideas and inspiration by trying other projects and reading the scripts	2. Reusing and remixing		
3.B.8. Observe what happens when you run your project	1. Testing and debugging		
3.B.9. Organize the scripts in ways that make sense to you and to others	"4. Abstracting and modularizing"		
3.B.10. Give credit to people whose work you build on or are inspired by	2. Reusing and remixing		
**3.B.11.			
3.B.11. In this example, what will the puppy say?	3. 4 (4 points)	Using Math Operator Blocks. Module 1	
**3.B.12.			
3.B.12. If the code is entered, in which direction will the cat moved?	2. Lower right of the screen (4 points)	Module 2: Motion and Direction in XY Coordinates	
**3.B.13.			
3.B.13. When does Abby appear in this story?	2. When Anne says "Come here!" (4 points)	Module 3 and 4: Story Creation and Animation in Scratch	
**3.B.14.			
3.B.14. What shape will the following code make?	3. Triangle (4 points)	Module 5: Polygons and Flowers	
**3.B.15.			

3.B.15. Based on this Scratch Code, which of the list of items would not allow the player to win the game?	4. Key, ring of power (4 points)	Module 6 and 7: Games Question modified from "Randomized Controlled Trial and Process Evaluation of Code Clubs"	

3. C. Access to Coding/Scratch Support

Survey Question	Scoring	Competency	Included in Final Calculation?
3.C.1. I use online and offline resources to improve my coding/Scratch skills	1. Never (0 points) 2. Rarely (1 point) 3. Sometimes (2 points) 4. Very Often (3 points) 5. Always (4 points)	Global Framework 5.1 Problem Solving and Global Framework 5.4 Identifying digital competence gaps	
3.C.2. When I have a question about coding/Scratch, I use an on-line discussion forum.	1. Never (0 points) 2. Rarely (1 point) 3. Sometimes (2 points) 4. Very Often (3 points) 5. Always (4 points)	Global Framework 5.1 Problem Solving and Global Framework 5.4 Identifying digital competence gaps	
3.C.3. When I have a question about coding/Scratch, there is someone at my school that I talk to.	1. Never (0 points) 2. Rarely (1 point) 3. Sometimes (2 points) 4. Very Often (3 points) 5. Always (4 points)	Community of Practice	
3.C.4. I am confident in my ability to resolve any challenges that I may face when coding/using Scratch.	1. Strongly disagree (0 points) 2. Disagree (1 point) 3. Neither agree nor disagree (2 points) 4. Agree (3 points) 5. Strongly agree (4 points) 6. I have never used scratch (0 points)	DIGITAL LITERACY Competency 5: Problem Solving (5.1)	Not Correlated, excluded from compilation score

Correlation Analysis

	3.C.1	3.C.2	3.C.3	3.C.4
3.C.1	100%	80%	66%	39%
3.C.2	80%	100%	74%	40%
3.C.3	66%	74%	100%	31%
3.C.4	39%	40%	31%	100%

4. A. Enabling Environment: School Clubs

Survey Question	Scoring	Competency	Included in Final Calculation?
4.A.1. My school has student clubs	1. Yego (4 points) 2. Oya (0 points) 3. Simbizi (0 points)		
4.A.2. Clubs at my school are on the school timetable	1. Strongly disagree (0 points) 2. Disagree (1 point) 3. Neither agree nor disagree (2 points) 4. Agree (3 points) 5. Strongly agree (4 points)		
4.A.3. Student clubs take place	1. More than 1 time per week 2. Weekly 3. Every 2 weeks 4. Monthly 99. Other		
4.A.4. Student clubs run for	1. Less than 1 hour 2. 1 hour 3. 1-2 hours 4. More than 2 hours		
4.A.5. Students actively participate in clubs at my school	1. Never (0 points) 2. Rarely (1 point) 3. Sometimes (2 points) 4. Very Often (3 points) 5. Always (4 points)		
4.A.6. My school has STEM and/or ICT clubs	1. Yes (4 points) 2. No (0 points) 3. Don't know (0 points)		
4.A.7. Students participate in STEM and/or ICT clubs at my school	1. Never (0 points) 2. Rarely (1 point) 3. Sometimes (2 points) 4. Very Often (3 points) 5. Always (4 points)		
4.A.8. Girls and boys participate equally in clubs at my school	1. Strongly disagree (0 points) 2. Disagree (1 point) 3. Neither agree nor disagree (2 points) 4. Agree (3 points) 5. Strongly agree (4 points)		
4.A.9. I have in the past or am currently leading a student club at my school	1. Yes (4 points) 2. No (0 points) 3. Don't know (0 points)		

Correlation Analysis

	4.A.2	4.A.5	4.A.6	4.A.7	4.A.8	4.A.9

4.A.2	100%	15%	19%	17%	13%	10%
4.A.5	15%	100%	-1%	23%	33%	15%
4.A.6	19%	-1%	100%	81%	2%	25%
4.A.7	17%	23%	81%	100%	26%	30%
4.A.8	13%	33%	2%	26%	100%	13%
4.A.9	10%	15%	25%	30%	13%	100%

Very low correlations for 4A questions (except A6 and A7).
4A not consolidated into a score

4. B. School Club: Practice

Survey Question	Scoring	Competency	Included in Final Calculation?
4.B.1. I lead a STEM/ICT (or scratch club) at my school	1. Yes (4 points) 2. No (0 points)		Removed from Score as not correlated
4.B.2. I actively encourage girls to join STEM (Science, technology, engineering, and mathematics)/ICT (or Scratch) clubs at my school	1. Strongly disagree (0 points) 2. Disagree (1 point) 3. Neither agree nor disagree (2 points) 4. Agree (3 points) 5. Strongly agree (4 points) 6. Not applicable (0 points)	Expected Competency: Motivating learners, especially girls, to join the clubs and remain active in them	Suggestion: Remove not applicable at endline
4.B.3 I give students roles in the club to give them a sense of pride in the club and help with motivating other students to join.	1. Strongly disagree (0 points) 2. Disagree (1 point) 3. Neither agree nor disagree (2 points) 4. Agree (3 points) 5. Strongly agree (4 points) 6. Not applicable (0 points)	STEM.Org.UK Stem Clubs Handbook	Suggestion: Remove not applicable at endline
4.B.4.I let students decide on the activities that happen in the club.	1. Strongly disagree (0 points) 2. Disagree (1 point) 3. Neither agree nor disagree (2 points) 4. Agree (3 points) 5. Strongly agree (4 points) 6. Not applicable (0 points)	STEM.Org.UK Stem Clubs Handbook Expected Competency: Facilitating clubs in a learner-centered way, focusing on collaboration, problem-based learning and self-regulation	Suggestion: Remove not applicable at endline

Correlation Analysis: only of those who report that they are leading a club

	4.B.1	4.B.2	4.B.3	4.B.4
4.B.1	100%	21%	19%	12%
4.B.2	21%	100%	68%	59%
4.B.3	19%	68%	100%	82%

4.B.4	12%	59%	82%	100%

4.B.1 is not correlated.

4. C. School Club: Attitudes

Survey Question	Scoring	Competency	Included in Final Calculation?
4.C.1. I can lead a Scratch Club at my school.	1. Not at all confident (0 points) 2. Slightly confident (1 point) 3. Somewhat confident (2 points) 4. Moderately confident (3 points) 5. Completely confident (4 points)	Indicator 2: Percentage of trained teachers who report to feel competent to facilitate after school Scratc2h 2050 coding clubs	
4.C.2. I can motivate boys and girls to participate in a Scratch Club at my school.	1. Not at all confident (0 points) 2. Slightly confident (1 point) 3. Somewhat confident (2 points) 4. Moderately confident (3 points) 5. Completely confident (4 points)		
4.C.3. I can set learning targets for the Scratch Club with the club members.	1. Not at all confident (0 points) 2. Slightly confident (1 point) 3. Somewhat confident (2 points) 4. Moderately confident (3 points) 5. Completely confident (4 points)		
4.C.4. I can develop an agenda for each Scratch Club session.	1. Not at all confident (0 points) 2. Slightly confident (1 point) 3. Somewhat confident (2 points) 4. Moderately confident (3 points) 5. Completely confident (4 points)		
4.C.5. I can evaluate Scratch Club achievement against the learning targets.	1. Not at all confident (0 points) 2. Slightly confident (1 point) 3. Somewhat confident (2 points) 4. Moderately confident (3 points) 5. Completely confident (4 points)		

Correlation Analysis

	4.C.1	4.C.2	4.C.3	4.C.4	4.C.5
4.C.1	100%	91%	91%	91%	90%
4.C.2	91%	100%	92%	88%	89%
4.C.3	91%	92%	100%	93%	96%
4.C.4	91%	88%	93%	100%	94%
4.C.5	90%	89%	96%	94%	100%

5. A. Scratch/Coding in the Classroom: Attitudes

Survey Question	Scoring	Competency	Included in Final Calculation?
5.A.1. Both boys and girls can benefit from learning how to code.	1. Strongly disagree (0 points) 2. Disagree (1 point) 3. Neither agree nor disagree (2 points) 4. Agree (3 points) 5. Strongly agree (4 points)		
5.A.2. Coding/Scratch can help students learn problem solving skills.	1. Strongly disagree (0 points) 2. Disagree (1 point) 3. Neither agree nor disagree (2 points) 4. Agree (3 points) 5. Strongly agree (4 points)		
5.A.3.Learning coding/Scratch and participation in Scratch clubs can help students better understand future career options.	1. Strongly disagree (0 points) 2. Disagree (1 point) 3. Neither agree nor disagree (2 points) 4. Agree (3 points) 5. Strongly agree (4 points)		
5.A.4.Boys are naturally better at coding than the girls at my school.	1. Strongly disagree (4 points) 2. Disagree (3 point) 3. Neither agree nor disagree (2 points) 4. Agree (1 points) 5. Strongly agree (0 points)	REVERSE	Exclude: not correlated
5.A.5. It is not important to incorporate digital technologies like Scratch into the classroom if the school already has Coding or Scratch clubs.	1. Strongly disagree (4 points) 2. Disagree (3 point) 3. Neither agree nor disagree (2 points) 4. Agree (1 points) 5. Strongly agree (0 points)	REVERSE	Exclude: not correlated

Correlation Analysis

	5.A.1	5.A.2	5.A.3	5.A.4	5.A.5
5.A.1	100%	91%	88%	-40%	-37%
5.A.2	91%	100%	94%	-42%	-43%
5.A.3	88%	94%	100%	-44%	-45%
5.A.4	-40%	-42%	-44%	100%	57%
5.A.5	-37%	-43%	-45%	57%	100%

5A4 and 5A5 Excluded from the score

5. B. Scratch/Coding in the Classroom: Practices

Survey Question	Scoring	Competency	Included in Final Calculation?
5.B.1. I set digital learning activities that engage my students.	1. Strongly disagree (0 points) 2. Disagree (1 point) 3. Neither agree nor disagree (2 points) 4. Agree (3 points) 5. Strongly agree (4 points)	Based on SELFIE Questionnaire Secondary Schools. D8 engaging students	
5.B.2. I incorporate digital technologies/Scratch into my lesson plans	1. Strongly disagree (0 points) 2. Disagree (1 point) 3. Neither agree nor disagree (2 points) 4. Agree (3 points) 5. Strongly agree (4 points)	Indicator 3: Percentage of trained teachers who report to feel competent to integrate scratch into STEM/ICT lessons plans	
5.B.3. I use digital technologies/Scratch to tailor my teaching to students' individual needs	1. Strongly disagree (0 points) 2. Disagree (1 point) 3. Neither agree nor disagree (2 points) 4. Agree (3 points) 5. Strongly agree (4 points)	Based on SELFIE Questionnaire Secondary Schools. D6 Tailoring to students' needs	
5.B.4. I use digital technologies/Scratch to encourage my students to identify and solve problems	1. Strongly disagree (0 points) 2. Disagree (1 point) 3. Neither agree nor disagree (2 points) 4. Agree (3 points) 5. Strongly agree (4 points)	Inquiry Based Learning / 5 Es instructional model DIGITAL LITERACY Competency 5: Problem Solving (5.2)	
5.B.5. I use digital technologies/Scratch to facilitate student collaboration.	1. Strongly disagree (0 points) 2. Disagree (1 point) 3. Neither agree nor disagree (2 points) 4. Agree (3 points) 5. Strongly agree (4 points)	Based on SELFIE Questionnaire Secondary Schools. D9 Student collaboration DIGITAL LITERACY Competency 2: Communication and Collaboration (2.4)	
5.B.6. I use digital technologies/ Scratch to foster students' creativity.	1. Strongly disagree (0 points) 2. Disagree (1 point) 3. Neither agree nor disagree (2 points) 4. Agree (3 points) 5. Strongly agree (4 points)	Based on SELFIE Questionnaire Secondary Schools. D7 Fostering creativity	
5.B.7. I teach my students how to behave safely online.	1. Strongly disagree (0 points) 2. Disagree (1 point) 3. Neither agree nor disagree (2 points) 4. Agree (3 points) 5. Strongly agree (4 points)	Based on SELFIE Questionnaire Secondary Schools. F2: Safe behavior DIGITAL LITERACY Competency 4: Safety (4.3)	
5.B.8. I teach my students how to give credit to others' work.	1. Strongly disagree (0 points) 2. Disagree (1 point) 3. Neither agree nor disagree (2 points) 4. Agree (3 points) 5. Strongly agree (4 points)	Based on SELFIE Questionnaire Secondary Schools. F5: Giving credit to others' work DIGITAL LITERACY Competency 2: Communication and Collaboration (2.2)	

5.B.9. When my students have questions about digital technologies/Scratch, I direct them to online/offline resources to find their answers.	1. Strongly disagree (0 points) 2. Disagree (1 point) 3. Neither agree nor disagree (2 points) 4. Agree (3 points) 5. Strongly agree (4 points)	Expected Competency: Pointing members to resources to continue developing their coding skills DIGITAL LITERACY Competency 5: Problem-Solving (5.4)	

Correlation Analysis

	5.B.1	5.B.2	5.B.3	5.B.4	5.B.5	5.B.6	5.B.7	5.B.8	5.B.9	
5.B.1	100%	71%	65%	67%	63%	71%	63%	61%	57%	58%
5.B.2	71%	100%	83%	79%	76%	77%	57%	63%	73%	64%
5.B.3	65%	83%	100%	89%	82%	85%	64%	70%	74%	68%
5.B.4	67%	79%	89%	100%	88%	88%	73%	72%	78%	70%
5.B.5	63%	76%	82%	88%	100%	91%	66%	67%	77%	68%
5.B.6	71%	77%	85%	88%	91%	100%	67%	68%	75%	69%
5.B.7	63%	57%	64%	73%	66%	67%	100%	82%	71%	61%
5.B.8	61%	63%	70%	72%	67%	68%	82%	100%	77%	62%
5.B.9	57%	73%	74%	78%	77%	75%	71%	77%	100%	65%

5. C. Coding in the Classroom: Self-Efficacy

Survey Question	Scoring	Competency	Included in Final Calculation?
5.C.1. I have the skills to incorporate Scratch into my lesson plans.	1. Strongly disagree (0 points) 2. Disagree (1 point) 3. Neither agree nor disagree (2 points) 4. Agree (3 points) 5. Strongly agree (4 points)	Indicator 3: Percentage of trained teachers who report to feel competent to integrate scratch into STEM/ICT lessons plans	
5.C.2. My school leaders support me to use digital technologies/Scratch in the classroom	1. Strongly disagree (0 points) 2. Disagree (1 point) 3. Neither agree nor disagree (2 points) 4. Agree (3 points) 5. Strongly agree (4 points)	Based on SELFIE Questionnaire Secondary Schools. A3: New ways of teaching	
5.C.3. Teachers at my school talk about using digital technologies/ Scratch in the classroom	1. Strongly disagree (0 points) 2. Disagree (1 point) 3. Neither agree nor disagree (2 points) 4. Agree (3 points) 5. Strongly agree (4 points)	Community of Practice	

Correlation Analysis

	5.C.1	5.C.2	5.C.3
5.C.1	100%	86%	78%
5.C.2	86%	100%	86%
5.C.3	78%	86%	100%

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