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Design-Based Implementation Research Baseline Data Collection

Technical report

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Notes

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Reviewers

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Abbreviations and acronyms

AKF	Aga Khan Foundation
AKU	Aga Khan University
CPD	Continuous professional development
DBIR	Design-based Implementation Research
EdTech	Education technology
HT	Head teacher
ICT	Information and communication technology
LGA	Local Government Authority
LMS	Learning management system
RCT	Randomised controlled trial
RQ	Research question
SEND	Special educational needs and disabilities
TCPD	Teacher continuous professional development
TPD	Teacher professional development
WEO	Ward Education Officer

1. Introduction

This research study aims to investigate the effectiveness, cost-effectiveness, and sustainability of a tech-supported, decentralised, and school-based teacher continuous professional development (TCPD)[1] model, to improve learning outcomes in rural Tanzanian primary schools. The research will test and iteratively improve the national TCPD model and roll-out (including the semi-structured Communities of Learning), as outlined in the Tanzanian National TCPD Implementation Plan (↑Tanzania Institute of Education, 2021).[2] We seek to understand the model's effectiveness and the role that technology can play.

The research team includes researchers from EdTech Hub, Aga Khan University, and the Tanzania Institute of Education. The study employs a Design-Based Implementation Research (DBIR) approach in the first phase and an experimental study in the second phase.

1.1. DBIR phase (2022–23)

The DBIR phase is underway, and its research questions are as follows:

RQ1 relates to the decentralised, school-based TCPD model and implementation. It approaches the research at three levels of the education system.

> RQ1-A examines the system-level enablers and barriers to sustainable implementation of a school-based TCPD model in rural primary schools, aiming to understand system-level stakeholders' perceptions of these enablers and barriers.
>
> RQ1-B examines the key school-level enablers and barriers to making peer facilitators and head teachers effective in implementing the school-based TCPD, again exploring these school-level stakeholders' perceptions of the enablers and barriers.

[1] Note: we use TCPD, TPD (teacher professional development), and CPD (continuous professional development) relatively interchangeably throughout this report. TCPD is primarily used given this is the term the government uses to refer to the intervention overall. However, TPD and CPD are also used, particularly when reporting the qualitative findings, as this is how many participants refer to professional development.

[2] Tanzania Institute of Education. (2021). *National Plan for Teachers' Continuous Professional Development (4a)*. Tanzania Institute of Education.

RQ1-C examines the key teacher-level enablers and barriers to implementing the school-based TCPD, engaging with those at the classroom level to understand perceptions around enablers and barriers.

RQ2 specifically looks at the tech mediation within the TCPD model and implementation.

RQ2-A explores the appropriate uses of technology in rural school contexts with limited access to technology to support effective TCPD.

RQ2-B explores the relative costs of different intervention arms.

1.2. Baseline data collection

In March 2022, the team conducted a baseline study for the DBIR phase. We gathered data from eight schools which will be revisited across the DBIR research process. The team also piloted specific research instruments that will be used in the DBIR phase. The findings of this baseline research are summarised in this report.

2. Methods

The baseline study aimed to capture data related to the RQs outlined above in Section 1.1. via a teacher survey, school infrastructure survey, and digital literacy observations of teachers across the eight schools. These data sources offer insight into access, use, and perceptions related to technology and TCPD.

2.1. Sample

The research team visited eight schools in Mtama District Council in the southeastern Lindi region of Tanzania. Schools were selected based on their rurality, and we therefore expected limited access to technological resources and mobile network coverage. This was a key requirement for the sample, as, during the DBIR phase, technology will be introduced to some of these eight schools. Therefore, reducing the likelihood of contamination through existing school-level technology was important.

The eight schools were selected with support from the Aga Khan Foundation (AKF).[3] Five of these schools are participants in AKF's Schools 2030 project,[4] while the other three were selected based on proximity to the first five. All eight schools are part of the Foundations for Learning project,[5] in collaboration with the Aga Khan Foundation.

Table 1 shows the number of teachers and learners in each school, as recorded prior to the data collection.

Table 1. *Number of teachers and learners*

School	Number of teachers	Number of learners
School 1	7	653
School 2*	9	844
School 3	5	173
School 4*	6	585
School 5*	16	791
School 6*	10	726
School 7*	8	512
School 8	5	128
Total	**66**	**4412**

** indicates schools in the Schools2030 project*

[3] See https://www.akdn.org/our-agencies/aga-khan-foundation Retrieved 5 December 2022
[4] See https://schools2030.org/ Retrieved 5 December 2022
[5] See https://www.aku.edu/news/Pages/News_Details.aspx?nid=NEWS-002675 Retrieved 5 December 2022

2.2. Data collection procedures

Table 2 summarises the data collection tools implemented in March 2022 and identifies whether the tools were used for the baseline (across all eight schools), for piloting, or tested for iterative purposes in preparation for the DBIR.

Table 2. *Data collection tools*

No.	Tool
Baseline (rolled out in eight schools)	
1.	School infrastructure survey with head teacher
2.	Digital literacy observation with teachers
3.	Teacher survey
DBIR piloting (tested in a subset of the schools)	
4.	Classroom observation
5.	Teacher Focus Group Discussion (FGD)
6.	Key Informant Interviews with Ward Education Officer (WEO), head teacher

The data collection software mwater[6] was used for the three baseline tools and the classroom observation tool. Mwater has good geospatial functionality while also offering good services for toggling between different languages during data collection. All data collection was conducted in Swahili.

The tools can be found in Swahili here. The English version of the tools can be found in this researcher pack. Note that both researcher packs are live, working documents, constantly being reviewed and updated following piloting and use in schools and with participants.

2.3. Methodological limitations

There was insufficient time to pilot the baseline research instruments before rolling them out in schools. As such, the research team had to react 'in the moment' in schools to things such as bugs in the mwater software, ambiguities with translation, and other procedural problems that occurred during data collection.

[6] See https://www.mwater.co/platform Retrieved 5 December 2022

The translation of some of the instruments into Swahili created confusion among researchers. The confusion was amplified due to different ways of interpreting some Swahili terms e.g., “engagement” was translated into a Swahili term which translated more accurately as “lead” — this led to some participants selecting the incorrect option when asked if they had ever engaged in TPD. This resulted in us needing to re-run parts of the surveys with teachers. In future, backward translation (translation from English to Swahili and then back to English) will be essential to ensure that meanings and connotations are translated effectively.

Securing parent and / or caregiver and teacher participation and consent for the research was a complex — school-specific — issue. Establishing an overarching process to be followed for each school context was challenging, largely because head teacher views differed from school to school. For example, different schools and communities required different approaches regarding covering transport costs for parents and refreshments / lunch for teachers.

The video-recorded community of learning (CoL) observation research instrument could not be piloted as CoLs were not yet active in schools. Initial piloting of the CoLs, therefore, took place in July 2022, with further piloting taking place in September 2022.

3. Findings

A general description of the eight schools is given in Section 3.1. before we delve into more detailed findings. These include findings from the school infrastructure survey (Section 3.2), the teacher survey (Section 3.3), teachers' digital literacy observations (Section 3.4), classroom observations (Section 3.5), focus group discussions (Section 3.6) and key informant interviews (Section 3.7).

3.1. Summary of school experiences

Across all schools, we noticed similar features: the gardens were beautifully maintained irrespective of classroom infrastructure quality; schools had a number of volunteer / community-paid teachers who were not on the official government payroll; Ward Education Officers (WEOs) frequently visited (and sometimes taught at schools), the head teacher's office always had information / certificates neatly displayed on the walls, and teachers and students often travelled home at lunchtime to get food.

3.1.1. School 1

Accessibility: School 1 is located along a tarmac road between Lindi town and Mtwara.

School conditions: The school had a combination of older and new classrooms. The new classrooms were affectionately termed 'Mama Samia classrooms' as they were recently built by President Samia Suluhu Hassan.

Engagement: The parent consent meeting attracted over 88 parents. This was due to the meeting taking place on the second day of the school visit (thus, there had been time for news about the research to be spread by word of mouth). Parents were highly engaged in the meeting, asked thoughtful and critical questions, and asked to be involved in future discussions around the TCPD programme.

Figure 1. *School 1. Old classroom on the right and the new classroom on the left*

3.1.2. School 2

Accessibility: Getting to School 2 required driving on unpaved roads for approximately 15 minutes.

School conditions: The school has a young, tech-savvy, assertive head teacher who has recently started his role. The school also had a dedicated ICT teacher who confidently stated that he was an expert during the digital literacy observation.

Engagement: The school had a supportive community structure that collectively contributed to the school feeding programme and salaries for additional non-government teachers.

Figure 2. *School 2 classroom block*

3.1.3. School 3

Accessibility: Getting to School 3 required driving on an unpaved road.

School conditions: School 3 was relatively small in terms of the number of teachers and learners. The school recently built a concrete toilet block, which was very clean and colourfully painted, encouraging good hygiene (see Figure 3). The community was active and seemed to be highly involved with the school.

Engagement: Parents were very keen to participate in the parent consent meeting, which took place outdoors as the classrooms were too small.

Figure 3. *School 3. Parent consent meeting with newly built toilets in the background*

3.1.4. School 4

Accessibility: School 4 was the most southerly school of the eight, close to the Lindi-Mtwara regional border and about an hour and a half from Lindi town by car on an unpaved road.

School conditions: One of the school blocks was made of traditional, locally sourced building materials. The school had mains power.

Engagement: The informed consent process had a good turnout, with 87 parents attending.

Figure 4. School 4. *Teacher survey taking place under a tree*

3.1.5. School 5

Accessibility: School 5 is located on a tarmac road, not far from Mtama.

School conditions: School 5 was unique in that it had learners and teachers with special educational needs and / or disabilities (SEND). The school infrastructure appeared to be of higher quality than other schools. This school had the largest number of teachers and learners of the eight schools we visited, although the numbers are small compared to schools in urban areas. During the data collection visit, many lessons were taught outside due to limited classroom space. Despite limited resources, teachers used innovative pedagogical techniques that were inclusive of SEND learners. The most assertive and engaged teacher, particularly when navigating the learning management system (LMS), was a visually impaired teacher. Piloting the LMS at this school provided very informative feedback in terms of the usability of the LMS for those with special needs.

Engagement: Due to the unique nature of the school within the region, the teachers and wider community were well-acquainted with the concept of researchers visiting.

Figure 5. *School 5 balcony area with artwork*

3.1.6. School 6

Accessibility: The school was fairly remote; we travelled around 5–10km on an unpaved road.

School conditions: The school buildings seemed well furnished, and some classrooms had ceilings.

Engagement: 100 parents attended the informed consent session. Parents asked pertinent questions, including what kind of data we would collect.

Figure 6. *School 6 classroom where observation took place*

3.1.7. School 7

Accessibility: School 7 is the closest school to Lindi town. The school is located just off the tarmac road between Lindi and Mtama and is near the District Education Office.

School conditions: There is no staff room for teachers, so some meetings are conducted outdoors.

Engagement: 23 parents from Standard 2 attended the informed consent session. Parents insisted we use photos and videos for the purposes of research only.

Figure 7. *School 7. Teachers using tablets to complete a survey on their teacher professional development needs and preferences*

3.1.8. School 8

Accessibility: School 8 was the most remote, located in a national park. Getting to the school required first driving on rough roads and then hiking the last 2 km to the school (see Figure 8).

School conditions: It was a small school with just five teachers (all male), including the head teacher, and around 20–30 learners per class. All the teachers were new, having been recently transferred. The school had no power source (mains, solar, etc.), and teachers reported significant issues with mobile network connectivity.

Engagement: There was considerable community engagement, and the community put noticeable effort into taking care of the environment around them.

Figure 8. *The 2km-hike to School 8*

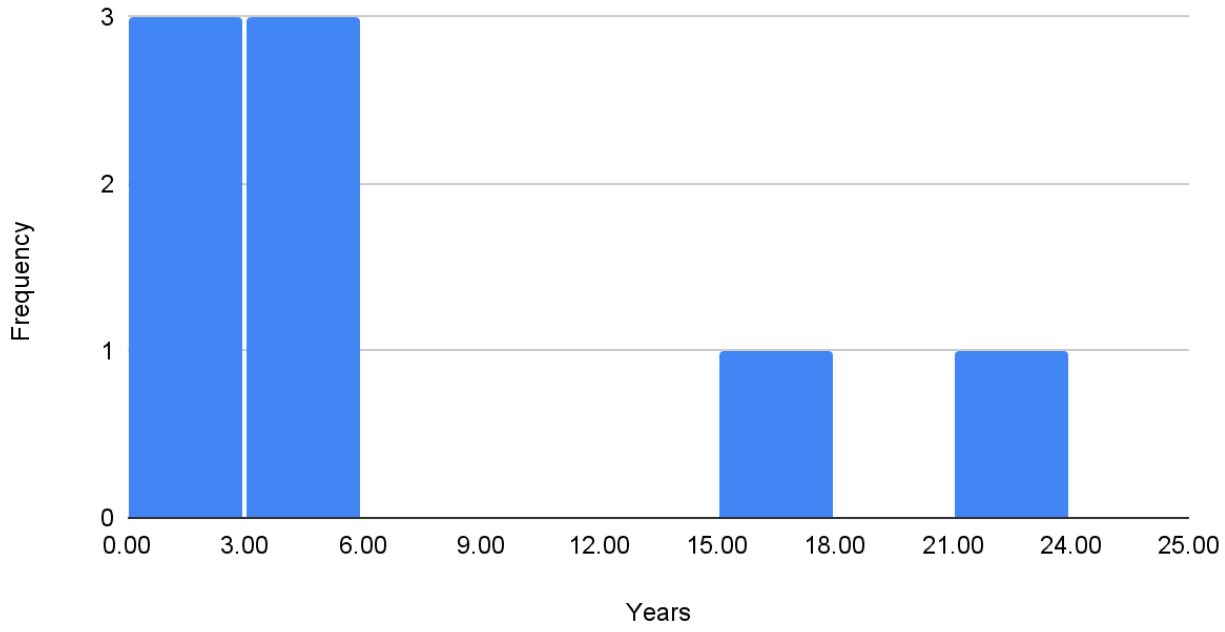
3.2. Summary of school infrastructure survey

School infrastructure surveys were conducted with head teachers.

3.2.1. Head teacher demographics

- Eight head teachers were surveyed — one from each school.
- All of the head teachers were male.
- Figure 9 shows the years teachers have been in their positions.
  - 75% (6) of the head teachers had been in the role for 6 years or less.
  - 25% (2) of the head teachers had been in the role for 17 or more years.

Figure 9. *Years in head teacher role*



3.2.2. Basic teacher and learner information

Table 3 presents the officially recorded numbers of teachers, learners, and classrooms in school as of March 2022. Note that teacher numbers vary depending on whether non-governmental / voluntary teachers were included in the numbers given.

Table 3. *Number of teachers, learners and classrooms*

School	Teachers (M)	Teachers (F)	Total teachers	Learners (M)	Learners (F)	Total learners	No. of Classrooms	Average class size	Pupil: teacher ratio
School 1	6	1	7	339	399	738	10	65	105.4
School 2	7	2	9	334	352	686	7	68	76.2
School 3	4	3	7	127	91	218	5	35	31.1
School 4	6	0	6	320	264	584	5	120	97.3
School 5	11	6	17	416	410	826	13	104	48.6
School 6	7	3	10	383	421	804	8	75	80.4
School 7	1	6	7	295	323	618	6	80	88.3
School 8	5	0	5	49	72	121	5	20	24.2
Total / average	**47**	**21**	**68**	**2263**	**2332**	**4595**	**59**	–	**67.6**

Note: *The green cells represent numbers that increased based on the information we obtained before the visit. The red cells represent numbers that decreased based on the information we received before the visit.*

3.2.3. Basic school infrastructure

Table 4 outlines whether head teachers perceived the number and quality of chairs and desks to be sufficient. Findings for both chairs and desks were the same, and the figures for them are thus combined. Head teachers at 7 out of 8 schools perceived the number of chairs and desks as insufficient and perceived their condition as either average or good.

Table 4. *Headteachers' perceptions of the condition of chairs and desks*

School	Sufficient number of chairs?	Condition of chairs	Additional notes
School 1	No	Good	Need more chairs
School 2	No	Good	Need to increase the number of chairs
School 3	No	Average	Need 76 more chairs
School 4	No	Average	Need maintenance
School 5	No	Average	
School 6	No	Poor	Need new desks and to repair
School 7	No	Average	
School 8	Yes	Average	Viboreshwe (Improved)

Table 5 outlines whether head teachers perceived the number and quality of the blackboards to be sufficient. Head teachers at 2 out of 8 schools perceived the number of blackboards to be insufficient, and 6 out of 8 head teachers perceived the condition of the blackboards to be either average or good.

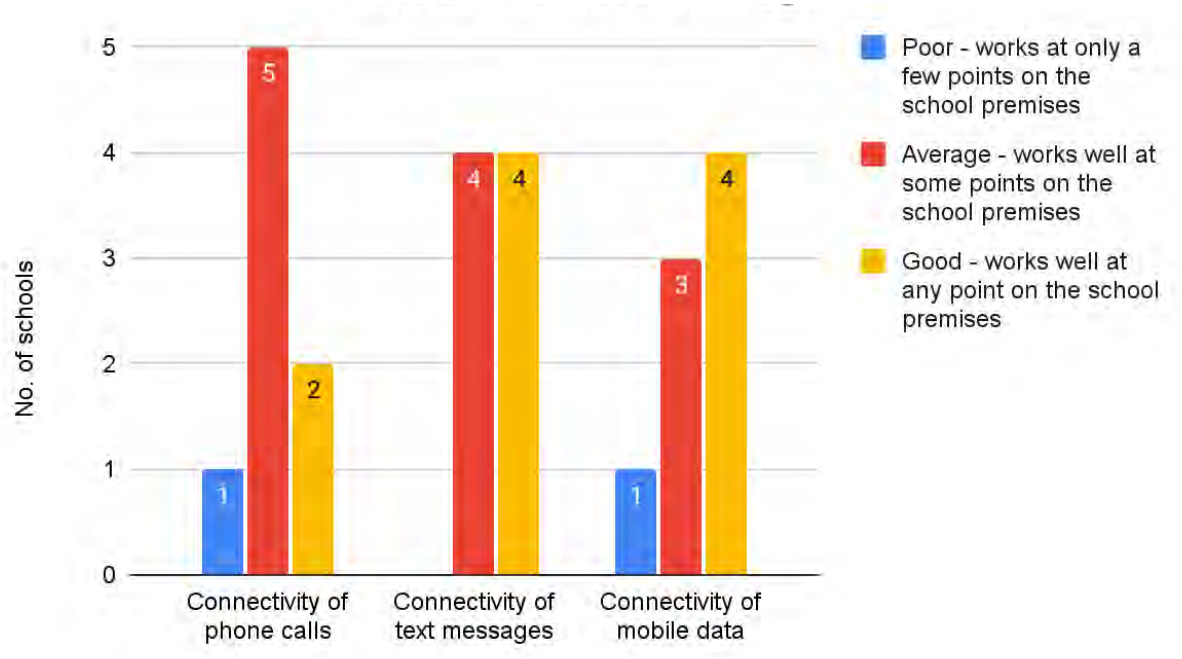
Table 5. *Headteachers' perceptions of the condition of blackboards*

School	Sufficient number of blackboards?	Blackboard condition	Additional notes
School 1	Yes	Good	Need maintenance
School 2	Yes	Average	Need maintenance
School 3	Yes	Good	
School 4	Yes	Average	Need maintenance
School 5	Yes	Good	
School 6	No	Poor	Need maintenance
School 7	No	Poor	
School 8	Yes	Average	Viboreshwe (Improved)

3.2.4. Electricity and connectivity

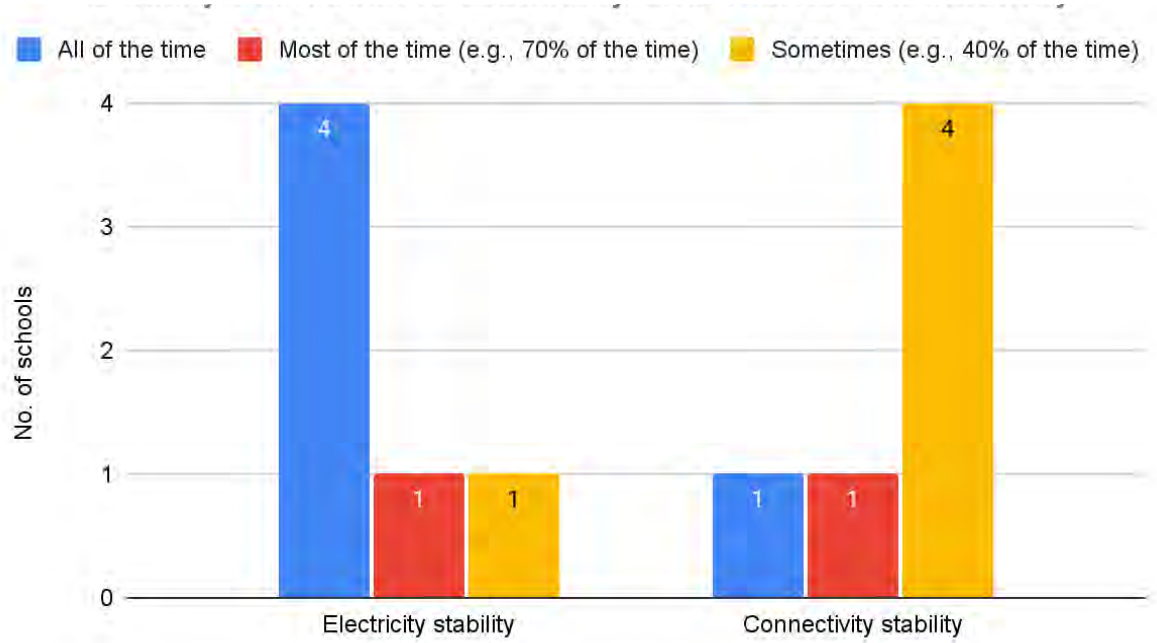
- Of the eight schools, six had electricity. School 8 and School 1 did not have electricity.
- Schools 5 and 6 had school-provided internet. These schools reported using 3G wireless mobile internet.
- The reported mobile network coverage for phone calls, text messages, and mobile data varied from school to school, depending on the location and how offroad and rural the school was.
- Figure 10 illustrates that text messaging coverage was consistently reported as being average or good, while phone call and mobile data coverage was poor in two schools.
- The reported quality within the survey was much higher than our actual experience at schools, where there was sometimes little to no mobile data connectivity. Coverage also varied according to the network provider. While we observed Vodacom generally had faster speeds, we found it had less coverage in the rural schools we visited. Tigo and Halotel were more reliable.

Figure 10. *Headteachers' perceptions of mobile network coverage at schools*



- Figure 11 illustrates that electricity is always available in four of the six schools that had electricity.
- Meanwhile, four out of the six schools experience intermittent connectivity (e.g., connectivity approximately 40% of the time).

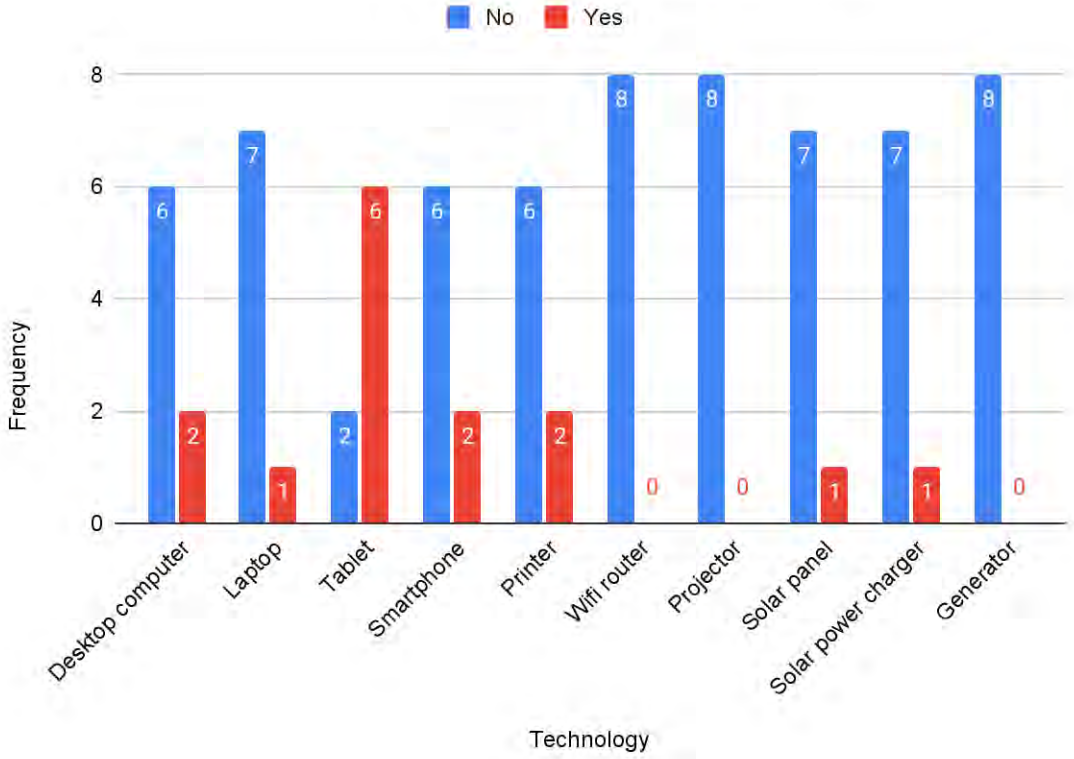
Figure 11. *Headteachers' perceptions of stability of electricity and internet*



3.2.5. Devices

Figure 12 illustrates the availability of different school-owned devices at the schools.

Figure 12. *Headteachers' perceptions of the availability of school-owned devices*



- In the three schools that owned computers (2, 5, 6), the desktops were Dell computers, and the laptop was Hewlett-Packard. They were reported as being used daily for administrative tasks, document preparation (e.g., exam papers), and printing. All computers were received in 2018 or later.
- The most common type of device schools owned was a tablet, with Samsung tablets commonly used. Tablets were used for administrative purposes, teaching and learning, internet browsing, and data storing and tracking. Table 6 provides information on the number and usage of tablets.

Table 6. *Headteachers' perceptions of the number and usage of tablets*

Tablets	No. of devices	Devices per teacher	Approx. date received	Frequency of use
School 1	4	0.6	2017-03-01	Daily
School 2	4	0.4	2015-08-01	Daily
School 3	1	0.14	2015-05-01	Monthly
School 4	0	–	–	–
School 5	2	0.11	2022-01-01	Daily
School 6	3	0.3	2020-07-01	Daily
School 7	0	–	–	–
School 8	1	0.2	2017-03-01	Monthly

Since the head teachers used their smartphones for both school and personal purposes, it was hard to differentiate whether they could be considered school-owned or not. If head teachers purchased the phone and paid for the airtime / data themselves, the research team deemed it a personal device.

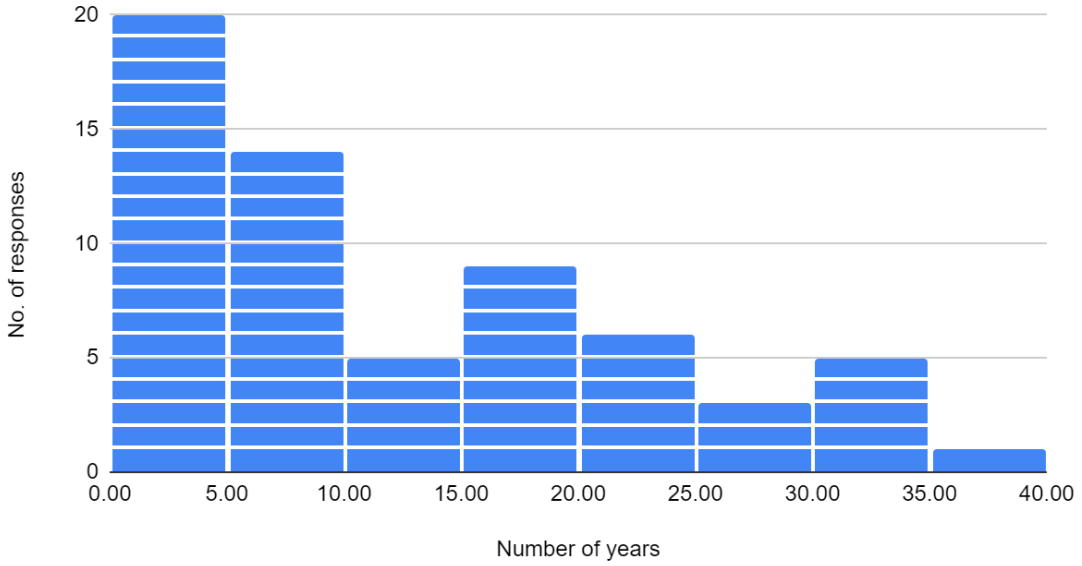
3.3. Summary of teacher survey

3.3.1. Demographics

- Of the total 68 teachers across the eight schools, we surveyed 63 (93%).
- Of these, 65% of teachers were male, and 35% were female.
- Figure 13 presents the number of teacher respondents by bands of years of experience
  - 32% of teachers had under 5 years of experience
  - 22% of teachers had between 5–10 years of experience

- 22% of teachers had between 10–20 years of experience
- 24% of teachers had over 20 years of experience.

Figure 13. *Distribution of the number of years of teaching experience*

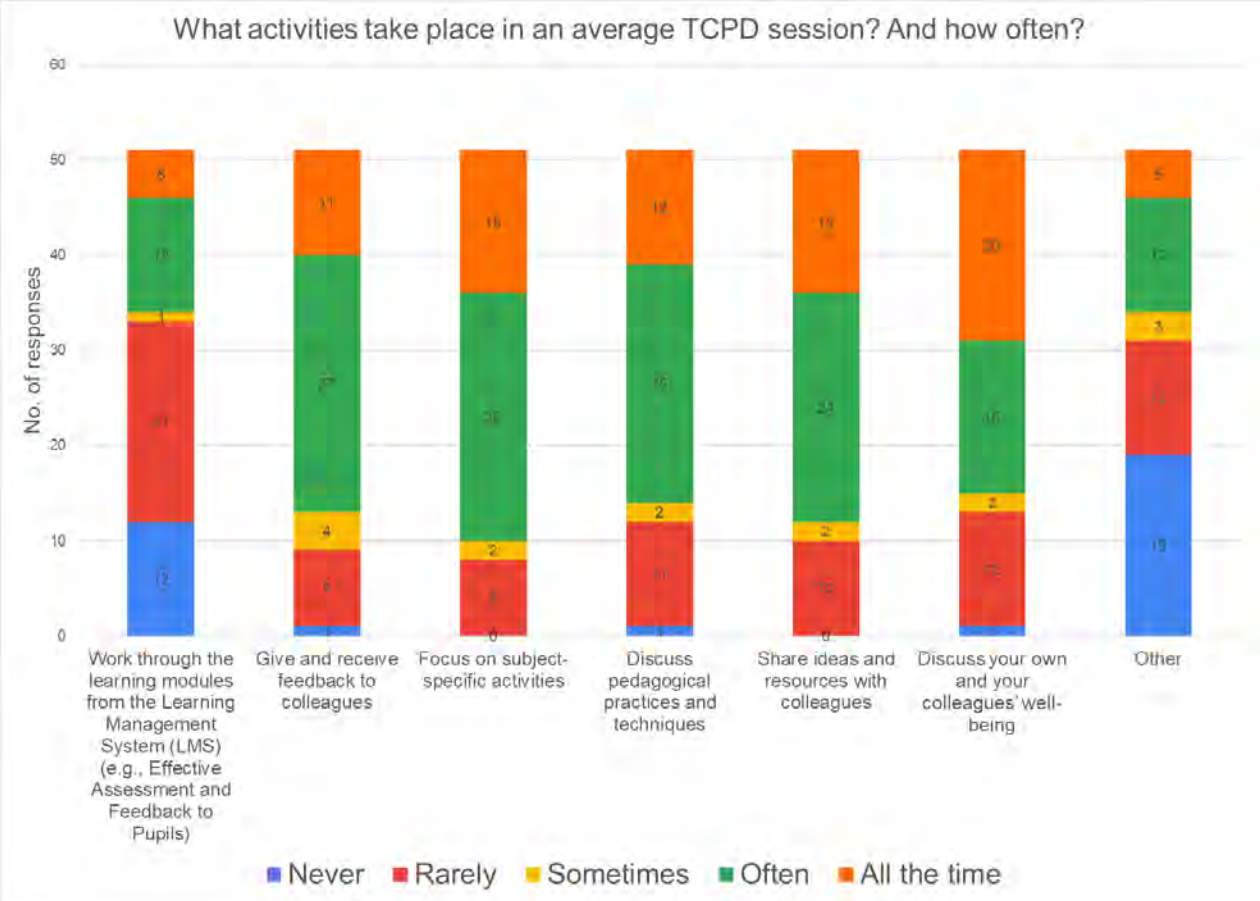


3.3.2. TCPD activities: Participation and activities

Figure 14 outlines how frequently teachers perceived the listed TCPD activities to be taking place. It should be noted that no formal, continuous (i.e., weekly) TCPD activities or sessions were taking place at school, so teachers were referring to informal engagements that they perceived as constituting a TCPD session.

- 81% of teachers had engaged in TCPD before.
- 27 teachers (42%) “often” gave feedback to colleagues, and 26 teachers (41%) “often” focused on subject-specific activities in TCPD.
- The most frequent TCPD practice was “discussing your own and your colleagues” well-being. Twenty teachers (32%) said they did this “all the time”.

Figure 14. *Frequency of engagement in TCPD activities*



- **Relevance, enjoyment and motivation**
  - 69.8% of teachers said TCPD activities were very relevant
  - 76.5% of teachers said they have been very motivated to engage in TCPD
  - 96.1% of teachers said they enjoyed the TCPD
- **Impact**
  - 70.6% of teachers said the TCPD had improved their teaching practice (27.5% said practice had improved "somewhat")
  - 55.6% agreed all students progressed in their learning, 73% agreed some students progressed in their learning, 69.8% disagreed that no students progressed in their learning.
  - 52.4% said technology supports their professional development "a lot", 42.9% said it helped "somewhat", and just 3.2% said it didn't help at all.

3.3.3. Technology

- 65.1% used technology to access TCPD, and 15.9% did not use technology
- Figure 15 outlines the devices owned by teachers across the eight different schools.
  - Basic phones were the most popular device, with 52 teachers (85%) owning basic phones.
  - Smartphones were the second most popular device, with 42 teachers (73%) owning smartphones.
  - In many cases, teachers had both a basic phone and a smartphone.
  - At School 6 and School 4, every teacher has a basic phone, while at School 5, nine out of ten teachers have a smartphone.
  - School 2's large amount of shared devices can be attributed to the school having four school-owned tablets and one school-owned laptop.

Figure 15. *Teachers' personal device ownership by school*

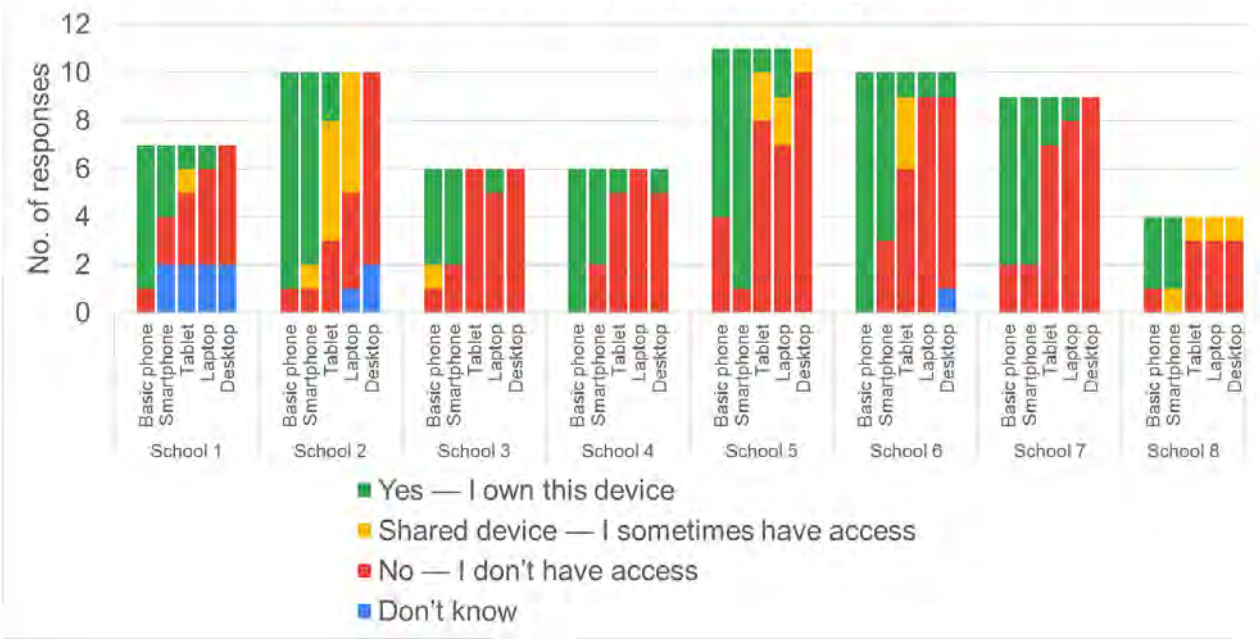
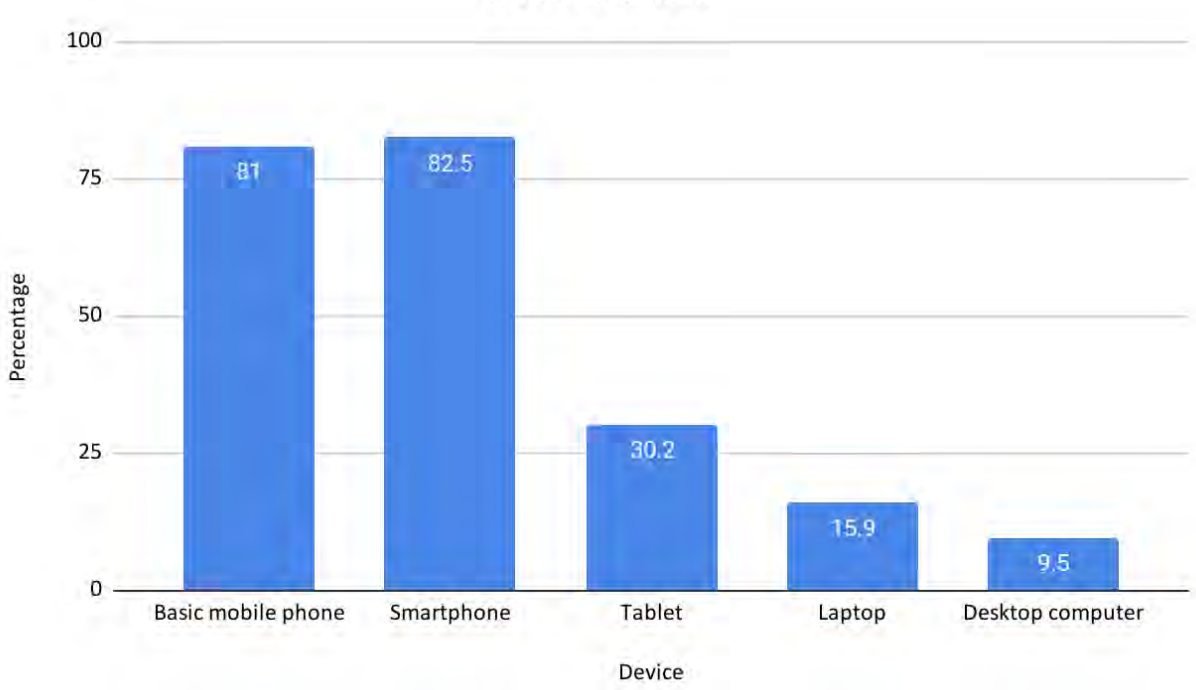


Figure 16 below shows how teachers reported use of devices for TCPD.

Figure 16. *Teachers' device use for TCPD*



Use of technology for TCPD by device

Basic phones

- 30% said they used a basic phone to work through modules on the LMS, but this cannot be true since the LMS has not as yet been rolled out and cannot be accessed on a basic phone.
- 71% said they used a basic phone to give and receive feedback from colleagues.
- 38% used basic phones to focus on subject-specific activities.
- 60% used basic phones to discuss pedagogical practices and techniques.
- 52% used basic phones to share ideas and resources with colleagues.
- 52% used basic phones to discuss their own or their colleagues' well-being, and 6% did not.
- 16% said their basic phone had 3G internet access, although 12% said their basic phones had no internet access at all.

Smartphones

- 54% said they used a smartphone to work through modules on the LMS, but the LMS has not yet been rolled out.

- 60.3% said they used smartphones to give and receive feedback from colleagues.
- 58.7% used smartphones to focus on subject-specific activities.
- 66.7% used smartphones to discuss pedagogical practices and techniques.
- 61.9% used smartphones to share ideas and resources with colleagues.
- 50.8% used smartphones to discuss their own or their colleagues' well-being.
- 25% said their smartphone had 3G internet access.

Tablets

- 22.2% said they used a tablet to work through modules on the LMS, but the LMS has not yet been rolled out
- 15.9% said they used a tablet to give and receive feedback to colleagues
- 19% used tablets to focus on subject-specific activities
- 20.6% used tablets to discuss pedagogical practices and techniques
- 19% used tablets to share ideas and resources with colleagues
- 15.9% used tablets to discuss their own or their colleagues' well-being

Laptops

- Limited ownership/use means limited scope for analysis

Desktop computers

- Limited ownership/use means limited scope for analysis

Connectivity

- Many teachers reported no internet connection across the devices listed (also probably down to limited device access in the first place).

School-level technology

- 24% of teachers said they used basic phones and smartphones regularly at school; however, 24% also said they had no access to a smartphone at school, and 26% said they had no access to a basic phone at school.

- 31% and 32%, respectively, said they had no access to a laptop or desktop computer at school.
- 21% of teachers said they had access to a shared tablet in schools, with 30% saying they used the school tablet for TCPD. Twenty-three per cent said school tablets had a 3G internet connection.
- Between 24 and 30% of teachers said they didn't use any school-level technology for their TCPD.
- 98.4% said they enjoyed the survey

3.4. Summary of digital literacy observations

Digital literacy observations were conducted with a subset of teachers at each school (52 teachers in total) to ascertain their baseline digital literacy levels. Teachers were asked to perform a set of tasks and were observed according to three indicators: 'Understanding', 'Completion', and 'Speed'. Teachers were ranked as either 'Novice', 'Intermediate', or 'Advanced' for each indicator, as described below. Teachers were also given the option of skipping a task if they felt they could not do it at all; this was marked as 'Not Observed'. See the researcher pack for the tool template.

If teachers had their own or a school-owned device, it was preferable that they completed tasks on these devices as they were familiar with the device. If they did not have a device, either a tablet or smartphone was provided for them to demonstrate their skills.

3.4.1. General comments

Throughout the digital literacy observations, School 2, on average, had more teachers with advanced skills compared to the other schools. We attribute this to the school having a champion ICT teacher who supported the development of other teachers, formally and informally, alongside the high levels of technology per teacher (see Table 6).

At the end of the digital literacy observation, teachers were asked to share further comments. The comments largely fell into three groups:

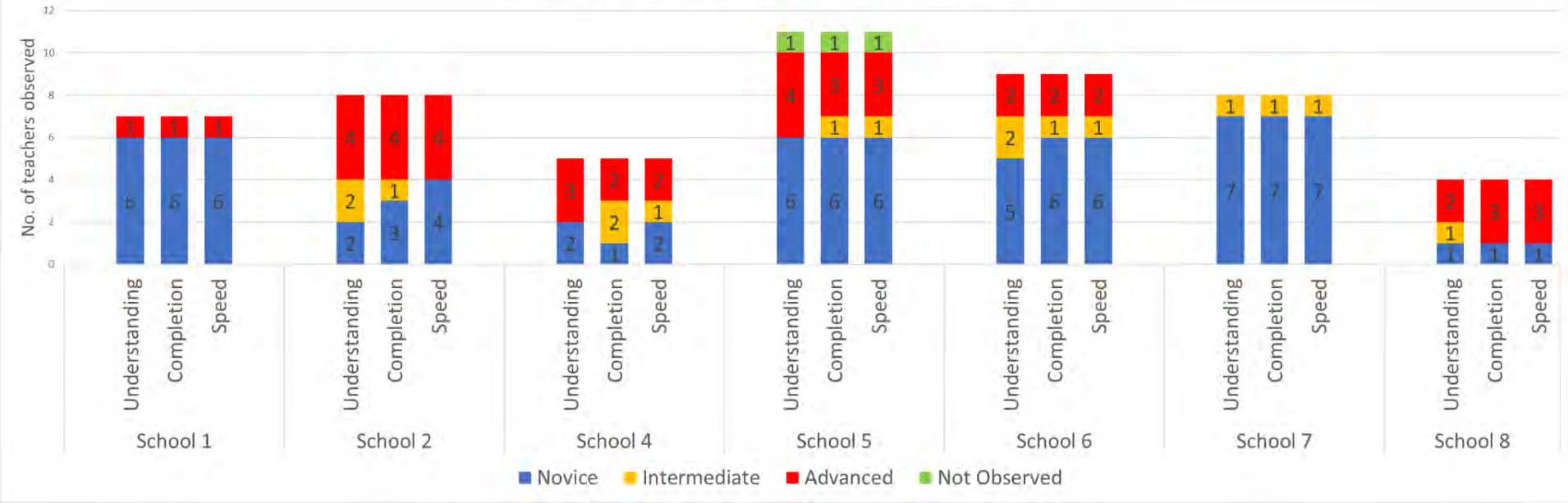
1. They would like more training and support on how to use technologies.
2. They would like the schools to have more technology.
3. The tasks motivated them to learn and practise the use of technology more

Data for School 3 is missing from this section due to an error in the data collection process.

3.4.2. Sending an email

Before the research, we had anticipated that teachers would be unfamiliar with email. We were pleasantly surprised to note that most teachers were aware of the device's email feature and could navigate to it. However, fewer teachers were actually able to use it. Figure 17 illustrates that the majority of teachers were considered 'Novices'. Only 15 teachers (29%) completed the task, which included finding the email icon, composing an email, and sending it.

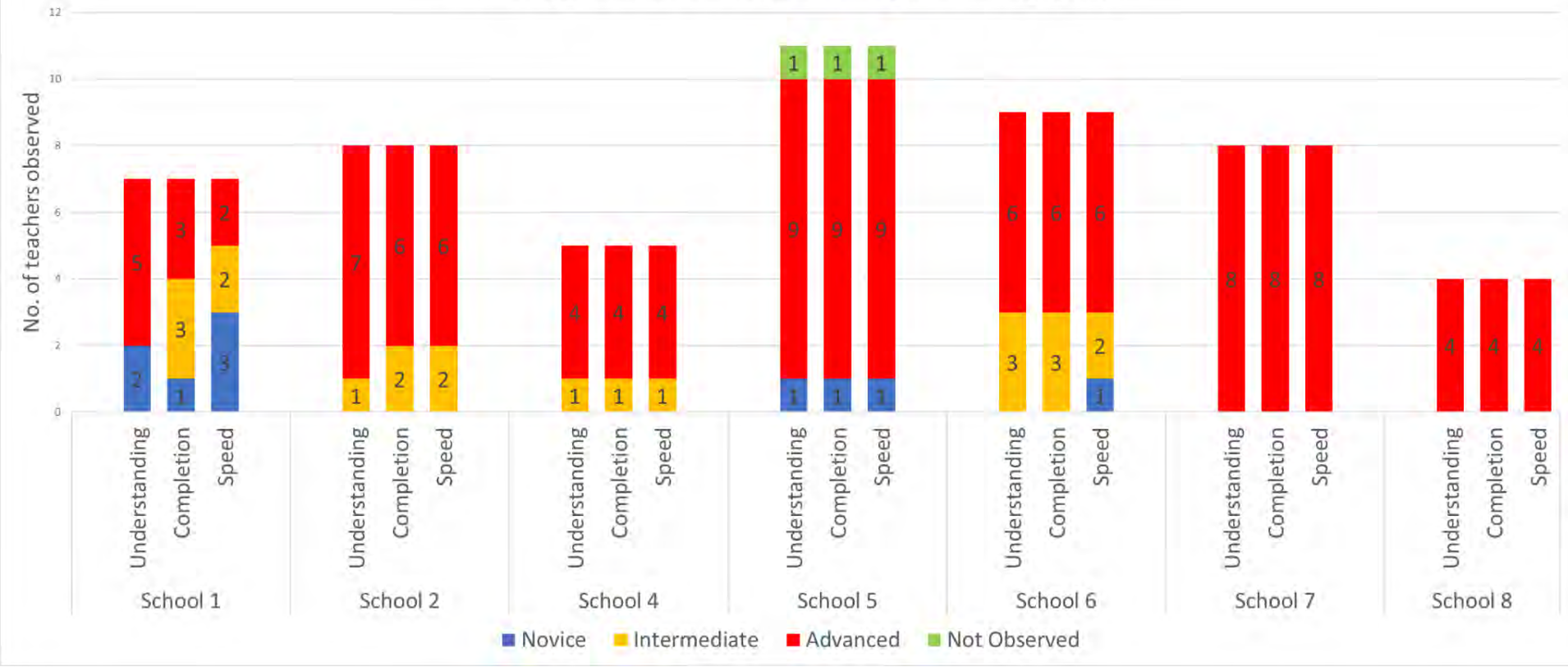
Figure 17. *Digital literacy observation — sending an email*



3.4.3. Sending a text message

As seen in Figure 18, teachers were very familiar with the concept of sending an SMS text message. Only two teachers could not complete the task at all (indicated as 'Novice'), and only one teacher opted not to attempt the task. Forty teachers (77%) completed the task at an 'Advanced' level. Teachers at School 7, who had very low email skills and no tablets at the school, were all rated highly for text messaging skills.

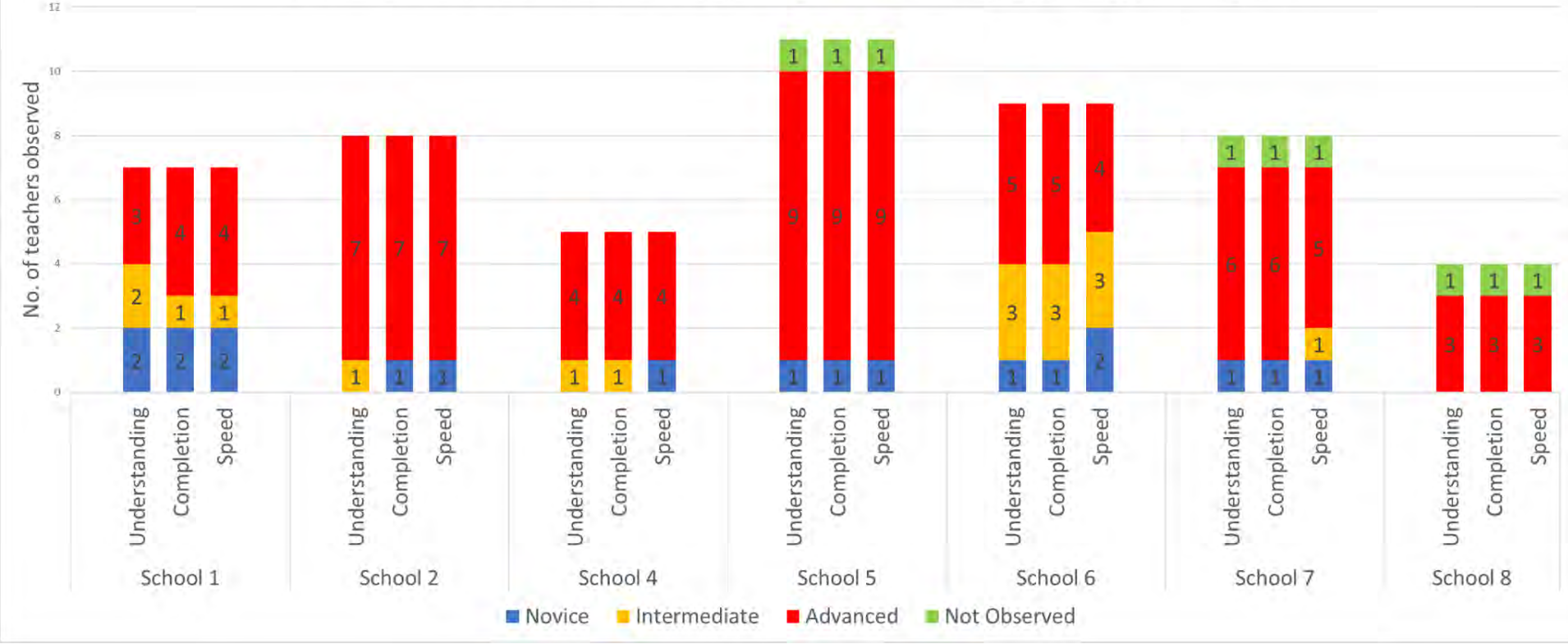
Figure 18. *Digital literacy observation — sending a text message*



3.4.4. Sending a message on instant messaging platforms

Similar to sending an SMS text message, 38 teachers (73%) completed the task of sending a message on social media to an 'Advanced' level. Proficiency was high across all schools, as can be seen in Figure 19.

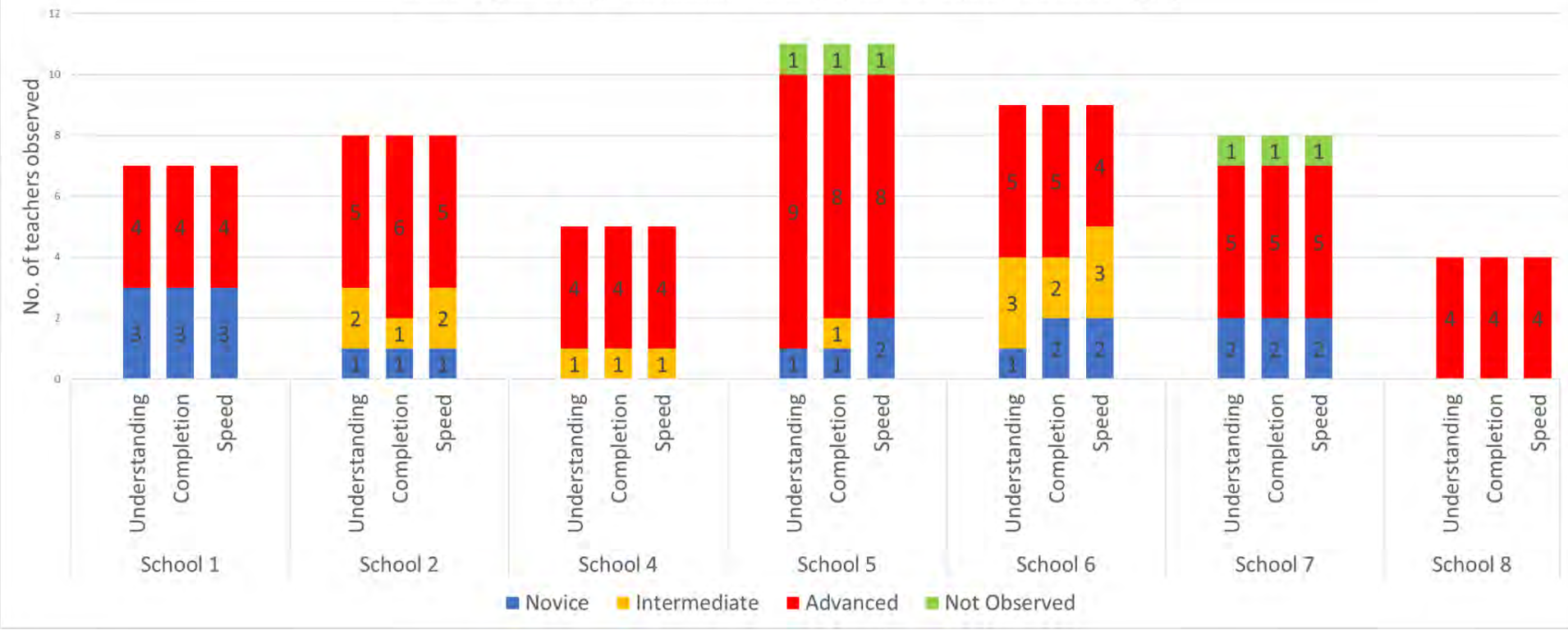
Figure 19. *Digital literacy observation — sending a message on instant messaging platforms such as WhatsApp or Messenger*



3.4.5. Sending a photo via SMS or instant messaging

A continued proficiency was seen for sending a photo on instant messaging. Thirty-six teachers (69%) completed the task, which was seen across all schools, as seen in Figure 20.

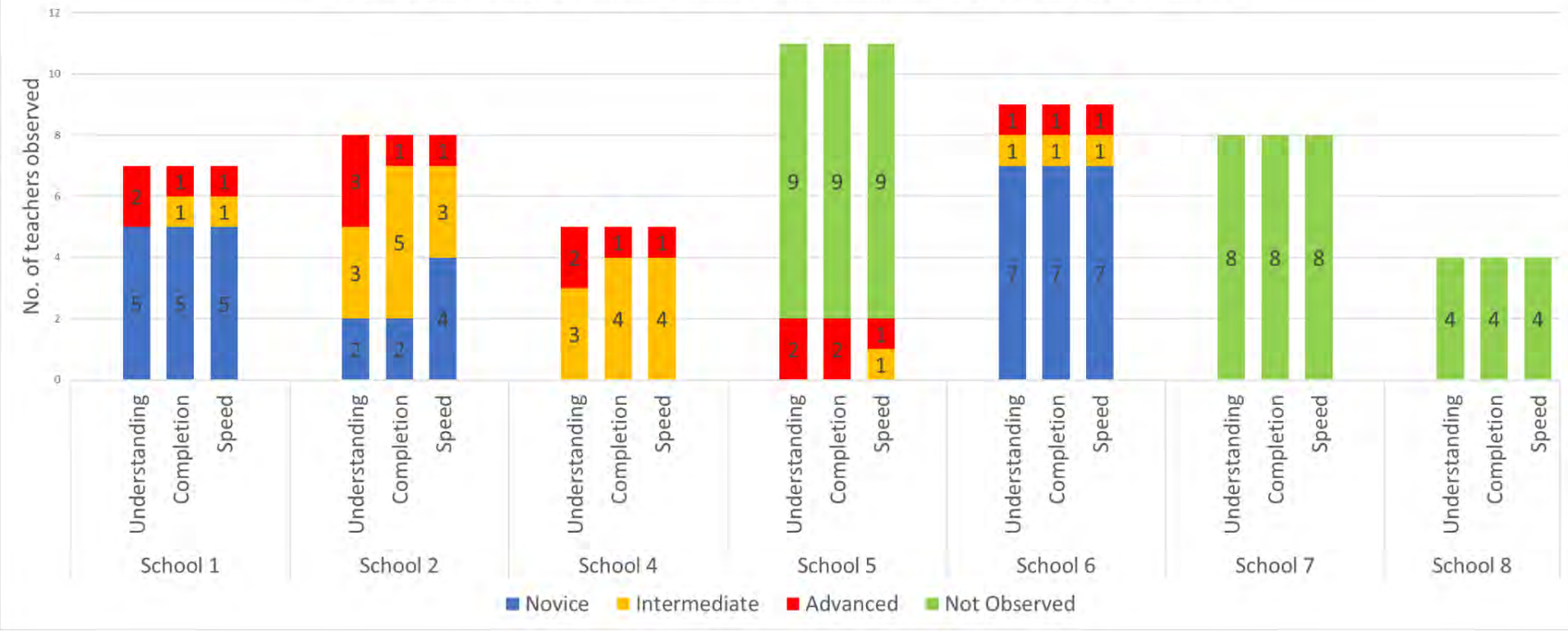
Figure 20. *Digital literacy observation — sending a photo via SMS or instant messaging*



3.4.6. Creating a new document

Teachers were given the option of creating a document on a device of their choice (smartphone, tablet, or laptop). As seen in Figure 21, only six teachers (12%) could complete the task. Twenty-one teachers (40%) opted not to attempt the task. Teachers from Schools 4, 5, and 7 had particularly low proficiency in this task.

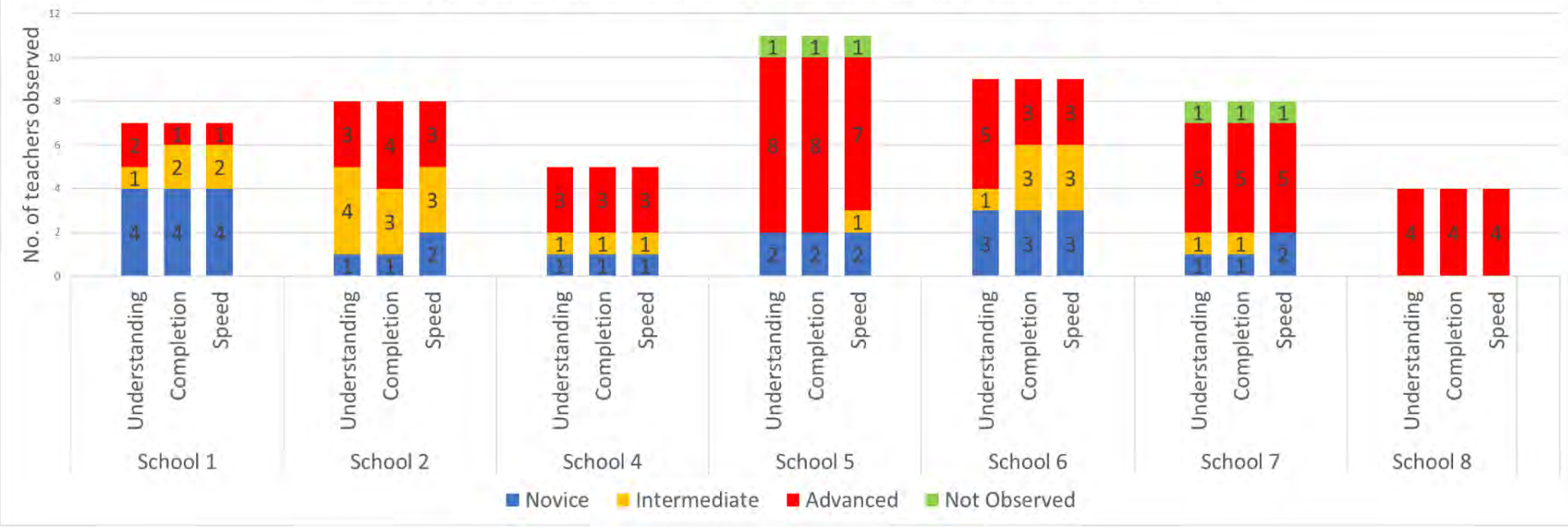
Figure 21. *Digital literacy observation — creating a new document using word processing software*



3.4.7. Sharing a document via SMS, social media, or email

Although teachers did not know how to create word documents, just over half knew how to share a document. Twenty-eight teachers (54%) completed the task at an advanced level, as shown in Figure 22.

Figure 22. *Digital literacy observation — sharing a document via SMS, instant messaging, or email*



3.5. Summary of classroom observations

- Classroom observations were conducted in six of the eight schools. Two were conducted at School 5.
- Observations followed a high (3) medium (2) low (1) scoring rubric. See the research instruments pack to view the whole instrument with scoring criteria.

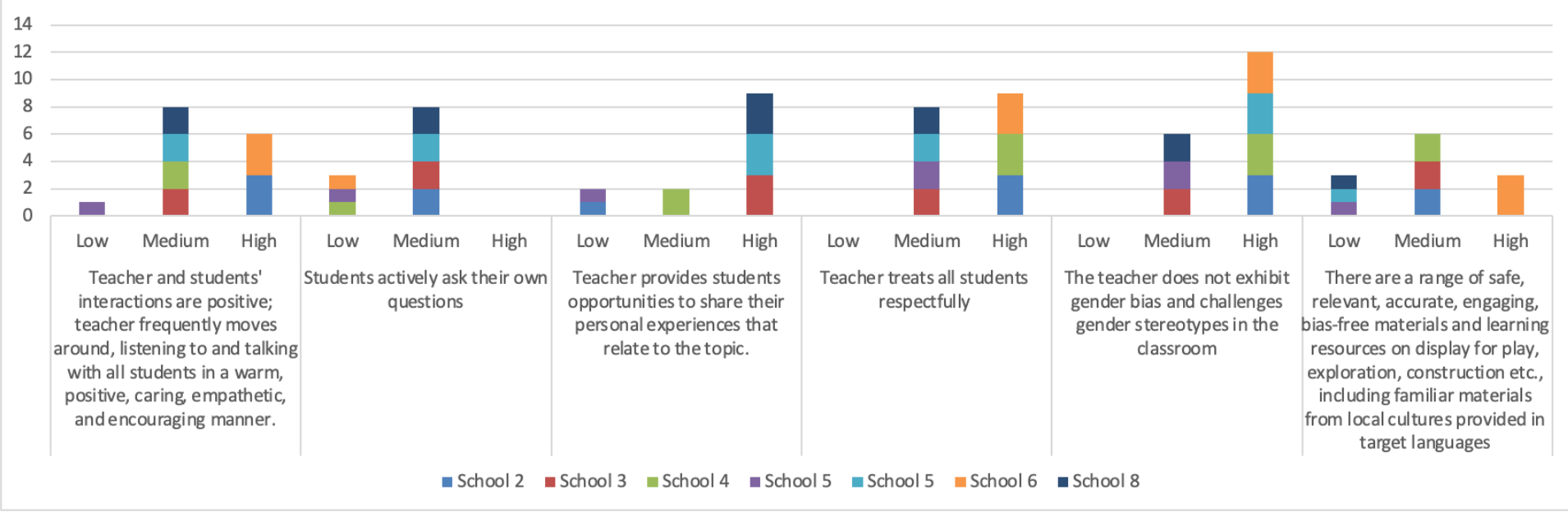
3.5.1. Basic information

- 100% of the classes started and finished on time.
- In one class (School 4), more than 126 learners were present; otherwise, Schools 3 and 4 had the fewest learners.
- Swahili was the most common subject taught (observed three times); mathematics was observed twice, while English and science were observed once each.

3.5.2. Positive climate and classroom environment

- Teachers generally scored “medium” (2) for this category.
- Teachers often treated students respectfully and showed no gender biases.
- Few students asked questions during the observed lessons, while safe and relevant learning aids were also lacking in observed lessons. These are areas for improvement within this observation focus.

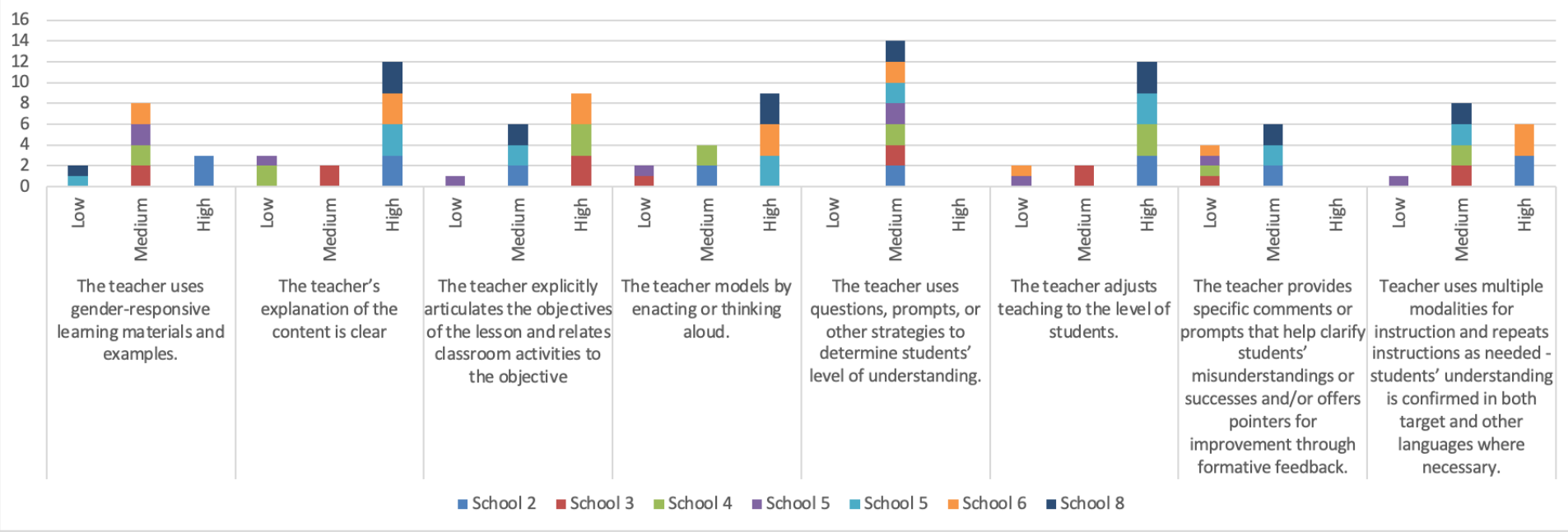
Figure 23. *Positive climate and classroom environment*



3.5.3. Facilitation skills and strategies

- "Medium" (2) was again the most prevalent score for this observation focus.
- Notably, all teachers observed were rated medium on the use of questions, prompts, and other assessment-for-learning strategies.
- Teachers scored "high" on clarity of explanation and adjusting learning to students' levels.
- Teachers scored lowest in providing formative feedback and helping clarify misunderstandings or misconceptions.

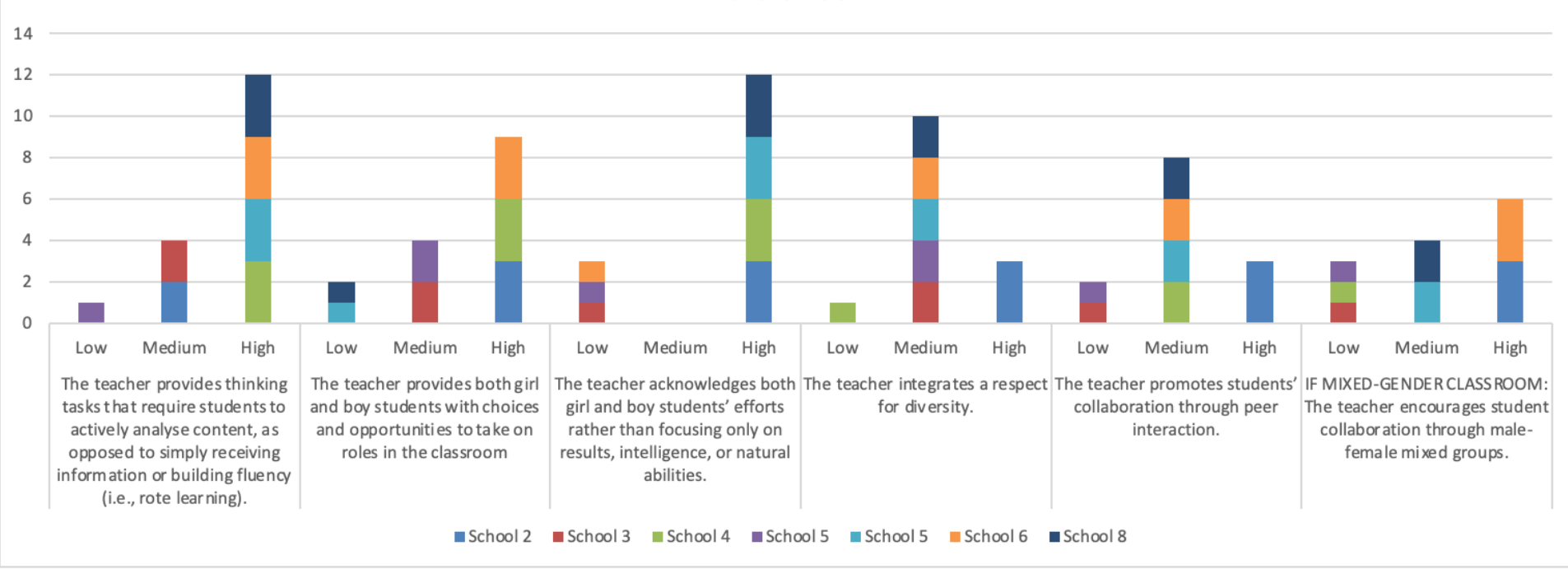
Figure 24. *Facilitation skills and strategies*



3.5.4. Supporting positive development

- There was a fair degree of variation for this category.
- Teachers scored "high" for providing thinking tasks requiring students to analyse content.
- There was a clear split regarding teachers' acknowledgement of students' efforts, as opposed to their natural abilities, where four of the seven teachers scored "high", and three of the seven scored "low".
- Male-female student collaboration in groups was not frequently observed, scoring "low" in three observations.

Figure 25. *Supporting positive development*



3.5.5. Post-lesson reflection

- The final section of the tool ensures the researcher discusses the lesson observation with the teacher, encouraging reflection around "what went well" and "what would you improve?"
- Teachers noted successes such as time management and gender-equitable teaching.
- Teachers acknowledged areas requiring improvement, such using more varied teaching and learning aids and providing more engaging tasks to encourage active learning.

3.6. Summary of focus group discussions (FGD)

3.6.1. School 7

We noted the following from the transcribed data.

In the past, teachers would, in most cases, attend TCPD activities through workshops and training far away from their working stations. These activities benefited them by allowing them to learn and share experiences on various matters related to teaching and learning. However, since only a few teachers attended these workshops, they would need to share what they learned with their colleagues at school.

Teachers felt that using technology is effective as it saves time. However, most of the TCPD materials used in previous workshops were paper-based.

Logistical challenges of running TCPD

- Lack of infrastructure, inability to afford / purchase technology and a consequent lack of tech-devices in schools. The scarcity of tech devices requires teachers to share the few available.
- Large class sizes, hindering effective teaching, assessment, and individual student follow-up.
- Lack of enough digital teaching and learning materials for either teachers or learners.
- Given the school-based nature of the TCPD, disruption of school timetables potentially hinders effective teaching.
- Teachers asked about the possibility of being provided with vocational training via TCPD activities.
- They also asked about the possibility of being provided with tech devices to help them access and engage in TCPD activities and their daily practice as teachers.
- Teachers are motivated to engage in TCPD activities as they believe it enables them to learn new things, thus improving their teaching practice.
- TCPD has helped teachers be creative in using various teaching and learning approaches and improvising contextually relevant teaching and learning aids.

The previous TCPD activities that teachers have engaged in have positively impacted their performance. Teachers felt that various teaching and learning approaches had made their lessons comparatively more engaging. Furthermore, using interactive teaching and learning materials developed / improvised during TCPD activities has led to increased learner motivation and student performance and reduced truancy. Applying gender-responsive pedagogy has also motivated all learners to participate more fully in the teaching and learning process.

Teachers use their own tech devices (phones) to engage in TCPD activities through ordinary texts and WhatsApp groups. They also use their phones to search for teaching and learning materials for their own learning and also for their students. However, it was noted that some teachers have limited knowledge and experience in using these technologies to access and engage in TCPD; this is especially the case in areas with connectivity problems.

However, teachers reported that technology had supported them in accessing and engaging with TCPD activities, especially with searching for materials (access to online learning materials or from colleagues).

3.6.2. School 8

The location (rural, remote) of School 8, plus the low number of teachers (only five), disadvantages the school and teachers in terms of their ability to participate in TCPD activities. The only alternative is the provision of in-house TCPD activities, which are also affected by the fact that teachers lack skills in key areas related to the programme, e.g., technology use.

- Providing and taking part in TCPD through ICT is beset by the significant challenges of access to a reliable electricity supply and the lack of a network connection as teachers cannot prepare digital teaching and learning aids and explore videos / materials for teaching. Despite these challenges, technology can support access to TCPD.
- Provision and participation in TCPD mean contending challenges such as insufficient facilities, equipment, and teaching and learning resources such as manila sheets / paper, wood, etc., for improvising / developing interactive teaching and learning aids.
- Teachers also lack time to engage in CPD, given their many other responsibilities.
- Poor infrastructure and teachers' lack of creativity hinder the facilitation of the curriculum (e.g., the lack of resources for teaching science and ICT). However, teachers are motivated to undertake TCPD, which they

think would help them overcome the current challenges in facilitating the curriculum.

- Training improves teachers' performance in many areas, such as setting activities, chairing meetings, and in-classroom teaching and learning.
- Teaching with technology creates curiosity about how students learn.
- For TCPD to be effective, the time allocated should be protected in school timetables, village schools should be connected with solar power, and tech devices should also be provided.

3.7. Summary of key informant interviews (HTs/WEOs)

3.7.1. Head teacher interview — School 1

We noted the following from the transcribed data.

- Classrooms have many students; however, the ongoing national effort of building new classrooms will reduce the challenge this presents.
- Classroom furniture provision is inadequate; however, this does not mean that students sit on the floor; instead, they share the few available desks. The furniture available also needs maintenance.
- Network is available throughout the school premises. Staff can access all services like sending short messages, making calls, and accessing social media.
- The school is not connected to internet services. Teachers have to buy internet bundles for their phones to access the internet.
- The school has four tablets provided by different stakeholders six years ago; they are still in good working condition. The tablets are used daily for different purposes, including:
  - Administration: Maintaining teacher and student academic records and sharing them with different educational authorities and stakeholders.
  - Teaching and learning: Searching for student learning, lesson preparation, and teacher learning materials.
  - Programmes for student learning are installed, but only on one tablet. These programmes are for Classes 1 and 2 only. A teacher cannot leave a tablet with a student to interact with the learning materials because there are too few devices. The programmes /

learning materials saved on the tablet were uploaded by the donors who provided the tablets.

  - Teachers are not permitted to record or add anything to the tablets unless instructed to do so by school leaders.

- The school owns no other technology.

3.7.2. Head teacher interview — School 5

We noted the following from the transcribed data.

- The head teacher is not aware of the upcoming TCPD plans.
- The head teacher has attended several TPD sessions in the past, including training on leadership and management in education; school quality assurance; 3Rs (reading, writing, arithmetic); and special needs education.
- TCPD should be conducted within or near schools.
- Teachers must be supported with tech devices such as smartphones, tablets, laptops, and internet access.
- They need additional resources, such as relevant guidebooks for deaf, blind, and other teachers with special needs.
- Smartphones, tablets, and laptops must be installed with special programmes to help teachers with special needs.
- Teachers need support with the application of technology.
- TPD programmes need to be provided frequently so that teachers stay updated.
- Teachers are responsible for organising and planning learning activities for TPD at their working stations. They must also coordinate with the peer facilitator and mobilise the required resources.
- Through TPD programmes, teachers understood various issues, such as the need to be aware of learners with SEND and the use of braille. Teachers were also able to design and prepare learning and teaching aids thanks to attending TPD.
- Teachers are motivated to attend TPD opportunities because they want to stay up-to-date in knowledge and skills and other contemporary / emerging issues in education.

- The forthcoming TCPD programme needs to emphasise the use of technology in teacher learning and their daily teaching practices.
- Schools need to be supported in terms of infrastructure and technology items.
- The head teacher does not know the exact cost of running TPD programmes, however, he is aware that costs are incurred.
- Teachers tend to focus on what they will be paid after attending a workshop rather than the intended outcomes.
- Interference with the teachers' timetables by other administrative roles is one of the challenges of the TPD programmes.
- Incompatibility of the TPD programme with the Local Government Authority (LGA) programmes is another challenge.
- Teachers cannot afford to buy and maintain technologies.
- Internet access is another obstacle to using technology.
- Some teachers are resistant to change and using technology; they want to retain familiar ways of learning.
- TPD programmes help teachers to improve knowledge and skills and in turn, improve students' academic performance.
- TPD programmes should be allocated specific times to enable teachers to attend and concentrate on learning, and this should not be during school hours.
- Some TPD programmes use technology such as computers and projectors; however, participants do not interact with them. They are only used for the presentation / delivery of materials.
- More research is needed to inform the planning of future TPD programmes.
- A learning system that does not require internet connectivity is essential.
- Sharing information with LGAs when planning the TPD programme is crucial as it allows them to incorporate their requirements.
- The head teacher uses technology in his daily practice by preparing and sending daily institutional information to various education stakeholders and searching materials for teacher learning. Technology also helps the

head teacher to receive and share information from and with teachers and representatives from the sub-national and national government.

3.7.3. Head teacher interview — School 3

We noted the following from the transcribed data.

- The head teacher had not heard of the government's new TCPD plans, but he has attended other training and seminars. For example, a seminar on leadership, where one session focused on forming a quality assurance team at school and its responsibilities. After the seminar, the head teacher created a quality assurance team at the school. It is responsible for ensuring teaching quality by assessing teachers' lesson plans, schemes of work, and lesson notes
- During seminars, the head teacher pinpointed areas which are very important for his teachers to attend and engage in, such as teaching and learning methodologies, and using ICT in the teaching and learning process.
- The head teacher has the responsibility of making sure that all teachers participate in TCPD and share what they learn; he is also responsible for evaluating the impact of TCPD implementation on the school's academic performance.
- Training helps to improve the head teacher's activities because he can evaluate school performance by checking how teachers teach after training.
- The head teacher is aware of workshop-related expenses, especially for participants. He attended a workshop and received an amount for three days that he felt was insufficient to cover accommodation, meals, and transport costs.
- The head teacher explained some of the issues with the provision of TCPD at the school level, such as:
  - Long distances between teachers' working stations and the location of the TCPD activities.
  - Low or no payment.
  - Inadequate tech facilities such as laptops.
- The head teacher suggested TCPD should be offered in accessible locations, including locations with a network connection so that participants can access the internet. The head teacher has never

attended a workshop where participants and facilitators used technology such as laptops and projectors. Only hard copies / paper-based materials were used.

- Schools have tablets, which are used to send some school information needed by educational officers, and store school information such as examination results and teacher and student statistics, among other data.
- The head teacher is aware of the importance of technology in teaching and learning. He believes it simplifies the work and enables teachers to form groups, share learning information, and send some educational documents (e.g., via WhatsApp).

3.7.4 Head teacher interview —- School 7

We noted the following from the transcribed data.

- The head teacher was not aware of the new government TCPD plans. The school needs to understand the new TCPD and how it should be facilitated; The school would like to use technology in TCPD but has no devices such as smartphones, tablets, and computers.
- The head teacher uses meetings to talk to teachers about teaching, learning, and other matters.
- TCPD at school helps to improve teacher practices, especially when it focuses on challenging areas. Therefore, teachers are motivated to participate in TCPD because they believe it will resolve the challenges they face in various areas of teaching and learning.
- The head teacher is not aware of any costs of TCPD but is aware of the per diem allowances teachers are paid for attending TCPD workshops.
- Finding time for TCPD is one challenge. It is vital to ringfence time for TCPD in the regular school timetable.
- Teachers are not given a chance to give their views on improving TCPD. This should be noted.
- Teachers must be prepared and undergo facilitation training before qualifying as peer facilitators.
- The head teacher believes that the new TCPD will bring changes by improving teacher practices in teaching and learning.

- According to the head teacher, technology saves time during the facilitation of CoLs and also helps with saving / storing administrative data / information for administrative purposes. Though some facilitators are not good at using ICT in facilitation, it might be because they are not using it frequently.
- Teachers have attended training sessions where facilitators used technology. Following this, some teachers adapted and started to use technology. Tech devices such as projectors and smartphones have been used in training, but there is a general lack of tech devices.
- The head teacher does not use technology in supporting TCPD.
- Using technology is very expensive as you need money to buy data for internet connectivity. The head teacher sometimes uses Whatsapp to communicate with fellow head teachers.
- A poor internet connection is one among other challenges in using technology.
- The head teacher insisted on improving the school's infrastructure, such as classes. The construction of some classes is incomplete, others are in poor conditions, and still others are overcrowded. In such situations, it is difficult to use technology to support learning.

3.7.5. WEO interview — School 2

We noted the following from the transcribed data.

- WEOs attend TPD training / workshops but are not informed about the new TCPD model and plans.
- Head teachers and academic teachers in this WEO's ward need to be equipped with teaching and learning materials such as books and tech items like computers and tablets.
- They also need materials for facilitating TPD programmes, like flip charts, manila cards, and other relevant resources in their schools.
- Head teachers and academic teachers need financial support to provide refreshments during TCPD at the school level.
- WEOs also need financial support for the motorcycle fuel used to follow-up in schools where TPD programmes are taking place, as other schools are located in remote areas.

- If teachers could stay at their working stations and TPD programmes were conducted at their school, it would benefit everyone as it would reduce costs and save time, but head teachers and academic teachers need to be supported with the training materials.
- Some teachers in this ward are good enough to be peer facilitators; however, they need more training in facilitation skills to improve their confidence. They also need knowledge and skills in using laptops and tablets.
- TPD programmes are helpful as they equip teachers with knowledge and skills and keep them updated, as there are always changes in the education system which require teachers to be updated.
- TPD programmes equip teachers with various teaching and learning approaches, leadership skills, and strategies for teaching large classes.
- Teachers are motivated to attend TPD programmes because they can update their knowledge and skills and improve in various professional areas to improve students' learning.
- Teachers need technical knowledge and skills concerning the application of technologies in learning.
- WEOs have not organised any TPD programmes, so they do not know precisely how much TPD costs. However, they know that costs are incurred for training materials, meals for participants, and training allowances. The organisers of the workshop / training usually cover all costs, including the provision of training materials.
- A lack of training resources and funds for organising the programme makes it challenging to run TPD programmes. WEOs cannot afford these costs without support.
- To overcome challenges that may arise during the programme, teachers' needs and demands need to be taken into consideration before planning TPD activities.
- It is expected that after TCPD, there will be significant changes in teachers' practices that will improve students' learning and academic performance, and teachers are also expected to grow academically.
- There is an expectation that the new model of TCPD will bring positive changes to teachers' practice and be cost-effective because of the use of technologies in teacher learning.

- It is suggested that Teacher Resource Centres (TRCs) should be active enough to provide teachers with ample time to discuss issues pertaining to their careers.
- Whenever possible, TPD programmes should be conducted during holidays to help teachers focus and concentrate on learning.
- Teachers have WhatsApp groups where they share their challenges, teaching experiences, and teaching and learning materials.
- WEOs use technologies to search for learning materials, share them with teachers, and keep records of teachers and students in their respective wards. Their roles require them to use and be familiar with the technologies as required.
- The use of technologies in TCPD will encourage teacher learning, and it will be sustainable as teachers will be able to learn continuously, using the materials available through those technologies. This includes the fact that they will not have to waste time travelling to TCPD workshops.

4. Conclusions

This baseline data collection exercise was a significant learning experience for the team. We gathered valuable data that will act as the basis for our two DBIR cycles; we discovered significant additional information regarding conditions of schooling in rural Tanzania beyond what was learnt through our research instruments. We learnt several lessons from a methodological perspective that will inform our research process going forward. This section highlights some of the key takeaways and finishes with implications for our research in light of the findings.

4.1. Key takeaways

4.1.1. School information

- Head teachers tended to be in the role for a short period (75% in the role under 6 years) or an extended period (25% in roles over 17 years). All head teachers were male.
- Overall, all schools except School 8 needed additional basic infrastructure such as desks and chairs. School 8 has a small average class size of 20 learners.
- The number of school-owned devices is relatively low. Schools 1 and 2 have the most devices, each with four school-owned tablets. School 7 has three smartphones.

4.1.2. Historic TCPD

- 81% of teachers had engaged in TCPD previously. TCPD primarily focused on giving feedback to colleagues (27%), subject-specific activities (26%), and well-being (20%).
- Historic TCPD rarely used technology and often used printed materials at centralised locations.
- More than two-thirds of teachers found TCPD relevant, three-quarters said they were motivated to participate, and almost all (96%) teachers said they enjoyed the TCPD.
- 70% of teachers said the TCPD had improved their teaching practice.

4.1.3. Technology use by teachers

- **65% of teachers used technology to access TCPD.** Fifty-two per cent of teachers said technology supports their professional development "a lot."
- **85% of teachers own a basic mobile phone, and 81% of these use a basic phone for TCPD**.
  - Most teachers use a basic mobile phone for peer communication. Seventy-one per cent said they used their phone to give and receive feedback from colleagues.
  - 16% said their basic phone had 3G internet access.
- **73% of teachers own a smartphone, and 83% of these use the smartphone for TCPD.**
  - More than half of teachers with a smartphone used it for a range of TCPD activities, the most common was discussing pedagogical practices and techniques (67%).
  - Just 25% said their smartphone had 3G internet access (**only a 9% increase of those who said their basic mobile phones had 3G internet access**).
- So, phones are prevalent; 24% of teachers said they regularly used basic phones and / or smartphones at school.
- Between 24% and 30% of teachers said they did not use any school-level technology for their TCPD.
- **Other devices (tablets, laptops, desktop computers) were much less common, both in personal ownership and at the school level.**
  - 65% of teachers don't own a tablet. That said, 21% of teachers said they had access to a shared tablet in schools, with 30% saying they used the school tablet for TCPD.
- **Infrastructural challenges were commonly reported,** notably:
  - Inability to afford technology, meaning limited device provision in schools.
  - Large class sizes, hindering effective teacher assessment and individual student follow-up.
  - Lack of enough digital teaching and learning materials for either teachers or learners.

4.1.4. Digital literacy skills

In keeping with the above findings, **teachers' current digital literacy is concentrated around phone use for communicating and sharing knowledge via sending messages, photos, or documents** rather than using larger-screen computing devices such as tablets / laptops / desktops for document creation. Use of email was relatively low, but this may reflect need rather than capability (given that messaging is prevalent). The following percentages of teachers can complete tasks at an "advanced" level.

- 77% of teachers can send a text message
- 73% of teachers can send a message on instant messaging
- 69% of teachers can send a photo
- 54% of teachers can share a document
- 29% of teachers can send an email
- 12% of teachers can create a document

4.1.5. Classroom practice

Observed teachers generally scored "medium" across the three categories of interest. Some good practice is clearly already in place across the eight schools. However, there was variance across the teachers observed.

- Areas of strength include:
  - Teachers' respectful nature towards students
  - Teachers' clarity of explanation
  - Teachers adjusting learning to students' levels
  - Teachers provide thinking tasks requiring students to analyse content.
- Areas for improvement include:
  - Low numbers of students actively asking questions during the observed lessons
  - Teachers' limited provision of safe and relevant learning aids
  - Limited provision of formative feedback
  - Teachers failing to help to clarify misunderstandings or misconceptions.

4.1.6. Concerns

Regarding the self-reported TCPD activities, teachers appear to think that their current TCPD is of good quality and that they are already engaging in several effective TCPD practices. This is unlikely, given that the schools do not have frequent or continuous TCPD sessions. At best, teachers may have been referring to self-organised sessions or informal discussions with their colleagues, but more information is needed here.

Similarly, teachers reported engaging with the LMS, yet an LMS had not been implemented at the time of the baseline data collection. Some teachers were involved in LMS piloting and thus could have been referring to this. Alternatively, teachers could have misunderstood the questions or might have been trying to give us answers they think we wanted to hear. Further data collection should address this concern around data validity.

4.2. Implications for our research

Research instruments: We will continue to update and improve our research tools following this initial baseline and pilot exercise. We endeavour to be open and make these tools available for reuse and adaptation for this research.

Tech devices: Given that the number of school-level tech devices differed across the eight schools, as did general school infrastructure, we will account for these differences when providing tech-devices during the DBIR by purposive sampling when we assign schools to technology profiles.

Incentives: Clarifying the level of participant engagement in research was a challenge that we must continue to address by working closely with head teachers, particularly given that certain teachers reported that a critical motivation for them is what they will be paid for engaging in workshops.

4.3. Implications for the government implementation

Mobile phones: Both basic mobile phones and smartphones were prevalent. The government could leverage the relative availability of these devices. It will also be interesting to assess their respective effectiveness compared to other tech devices used in the DBIR.

Time: Ensuring time to engage in TCPD is protected for teachers was a commonly reported concern. It is crucial to continue to communicate that TCPD is mandatory and ensure that teachers have protected time to engage in it. Following up on this issue during our qualitative research will be key.

Inclusion: TCPD materials must be developed with inclusion in mind, particularly for teachers with disabilities or specific needs. Our work in School 5 will be especially fruitful here.

Programme adaptation: Teachers' views should be gathered to improve the TCPD continually; several schools reported this. Our qualitative research should hopefully capture some of these views over the two cycles.

Cost: Costs for hosting TCPD in schools were a concern among head teachers and WEOs. Schools reported needing financial allowances when hosting TCPD to cover money for refreshments during sessions, fuel for WEOs to follow up on activities, etc.