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Shifting Power Dynamics in Education Decision-Making

Investigating the role of a matching algorithm to improve teacher deployment in Sierra Leone

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Abbreviations and acronyms

ASC	Annual School Census
EMIS	Education management information system
GPE	Global Partnership for Education
GIS	Geographic Information System
JSS	Junior Secondary School
MBSSE	Ministry of Basic and Senior Secondary Education
NASSIT	National Social Security and Insurance Trust
PPTR	Pupil-to-payroll-teacher ratio
PTR	Pupil-to-teacher ratio
PQTR	Pupil-to-qualified-teacher ratio
SGLA	Secondary Grade Learning Assessment
SLEIC	Sierra Leone Education Innovation Challenge
SSS	Senior Secondary School
TMIS	Teacher management information system
TSC	Teaching Service Commission
TSC HQ	Teaching Service Commission Headquarters

Background to the multi-year research

This report is part of the multi-year EdTech-Hub-Led project (HLR 3) on the Impact of GIS-Supported Teacher Allocation in Sierra Leone[1] where EdTech Hub and research partners Fab Inc and the Learning Generation Initiative are undertaking a series of research studies with the Sierra Leone Teaching Service Commission (TSC) to explore the most feasible approach to improving teacher allocation. The HLR 3 project aims to help government decision-makers by generating new evidence and providing insights on critical elements of teacher recruitment and deployment, such as teacher preferences and teacher mobility and retention patterns. Table 1 lists the research activities and studies in this series since 2021. The final studies in this series seek to understand whether using geographic information system (GIS) data and preference matching can help the TSC meet its policy goals around teacher deployment, such as ensuring a gender balance and improving allocation to remote schools.

The education workforce is the most important school-level determinant of student learning (↑Education Commission, 2019). Sierra Leone faces a particular challenge of a high number of non-payroll teachers, high pupil-to-teacher ratios and difficulties with deploying teachers to rural and hard-to-reach areas. For example, the pupil-to-qualified-teacher ratio rises from 44:1 for schools in urban centres to 76:1 for schools in rural areas (↑Mackintosh et al., 2020a). Even though the Teaching Service Commission (TSC) has developed different approaches to teacher deployment over the past few years, these reforms have not yet achieved the intended results.

In this context, the TSC has explored new options to address teacher deployment challenges, including an algorithm that uses an innovative preference matching model, harnesses geospatial data, and takes into account teacher preferences and school needs (such as pupil-to-teacher ratio among others) to strengthen workforce allocation. This report details findings from the final study in this series, which aimed to assess the impact of the new process using the algorithm on teacher deployment decision-making in 2024.

[1] See https://edtechhub.org/evidence/edtech-hub-research-portfolio/impact-of-gis-supported-teacher-allocation-sierra-leone/. Retrieved 15 May 2025.

Table 1. *Timeline of HLR3 research activities and outputs*

Date	Phase	Activities
2021	Proposal	EdTech Hub, Fab Inc and Education Commission worked on a technical proposal to present to the Teaching Service Commission (TSC) on supporting teacher allocation using GIS and a preference matching model. 🔖 **Key output:** Factors Related to Teacher Absenteeism in Sierra Leone — Literature review (No. 2) (↑Vijil et al.,2023)
2022	Kick-off	Worked with the TSC to further scope the research and understand what the TSC needed to know to improve teacher allocation. 🔖 **Key output:** *The impact of GIS-supported teacher allocation in Sierra Leone* —Inception Report, unpublished (↑EdTech Hub et al., 2022)
February 2022	Qualitative fieldwork	Undertook semi-structured interviews and focus group discussions with teachers and school leaders in two districts to explore teacher preferences. 🔖 **Key outputs:** *Using technology to improve the equity of teacher allocation in Sierra Leone: the challenge and a way forward — Blog post on qualitative work* (↑McBurnie et al., 2022c) *When teachers are asked to deploy other teachers, we learn a lot about teacher preferences — Blog post on qualitative work* (↑McBurnie et al., 2022a) *What Matters Most for Teacher Deployment? A Case Study on Teacher School Choice Preferences in Sierra Leone* — Report on qualitative fieldwork (↑McBurnie et al., 2022b)
August 2022	Quantitative analysis	Quantitative survey of school leaders' perceptions of what shapes school location preferences and the factors that should be in place to address the imbalanced distribution of qualified teachers in the country. 🔖 **Key output:** *School Leaders' Preferences on School Location in Sierra Leone* Technical Report — (↑Espinoza-Revollo et al., 2022)
March 2023	Quantitative analysis	Quantitative analysis was carried out nationally to analyse movement and retention of payroll teachers from 2015 to 2021.

		🔖 **Key outputs:** *Where do teachers go, and where do they stay? — Blog post on quantitative analysis* (↑Lurvink et al., 2023a) *School-to-School Mobility Patterns and Retention Rates of Payroll Teachers in Sierra Leone — Working Paper No. 48* (↑Espinoza-Revollo et al., 2023)
March 2023	Qualitative analysis	We explore whether mobility patterns vary by teachers' gender or qualifications, and whether the teaching workforce is urbanising. 🔖 **Key output:** *School-to-School Mobility Patterns and Retention Rates of Payroll Teachers in Sierra Leone — Working Paper No. 48* (↑Espinoza-Revollo et al., 2023)
November 2023	Qualitative fieldwork	Qualitative study into why teachers in Sierra Leone move schools. 🔖 **Key output:** *Teacher Retention and Mobility in Sierra Leone: What factors contribute to teachers' motivation to stay or leave schools* — Report (↑Lurvink et al., 2023b)
June 2025	Qualitative fieldwork & Quantitative analysis	A qualitative survey to better understand how changes to teacher deployment processes can facilitate equitable allocation to support improved learning for all and a quantitative analysis on the practicalities of implementing a matching algorithm amid data challenges and shifting priorities. 🔖 **Key outputs:** From algorithm outputs to classroom impact: A conversation with Marian Abu, director of teacher management at the Teaching Service Commission — Blog post (↑Frazer, 2024) *Shifting Power Dynamics in Education Decision-Making: Investigating the role of a matching algorithm to improve teacher deployment in Sierra Leone* — Report From Qualitative Survey — this paper (↑Godwin et al., 2025) Data-Driven Teacher Deployment in Sierra Leone: Practicalities and quantitative analysis of using a matching algorithm in the 2024/25 deployment cycle (↑Koutecký et al., 2025)

1. Introduction and background

In many low- and middle-income countries, the recruitment and retention of civil servants present a major policy challenge. In the education sector, governments have heavily invested in the education workforce to ensure all learners can access a quality education. Yet, schools in rural and deprived areas continue to lack trained and qualified staff (↑Asim, et al., 2017; ↑Clotfelter et al., 2007; ↑Evans & Acosta, 2021; ↑Patrinos & Kagia, 2007). Since teacher salaries constitute the costliest education inputs, developing an effective teacher workforce by prioritising the professionalisation of teachers and ensuring their effective management is a critical first step to improve education outcomes.

A key part of this process is ensuring enough qualified teachers are in the right places (↑Education Commission, 2019). Even where there are enough teachers, their uneven distribution across subjects, levels, and geographic areas can exacerbate existing inequalities. For instance, unequal distribution can increase the pupil-to-teacher ratio (PTR), making teaching and learning in some schools more challenging. A study in Zambia strongly suggested that larger class sizes resulting from unequal allocation of teachers were negatively associated with Grade 7 students' performance (↑Kabir, 2023).

Teacher allocation in many countries is not transparent and is subject to political actors and education stakeholders influencing where teachers are placed. Additionally, teachers often do not have enough information to make informed decisions about the schools they could work in, and their preferences are also not considered. Lack of accurate information on vacancies and school needs can create imbalances in supply and demand. Furthermore, deployment and retention of teachers in hard-to-reach and rural areas also present a significant challenge, especially in low- and middle-income countries where incentives and support are often lacking.

Effective policy and planning—especially recruitment and deployment—requires accurate and up-to-date data on teachers. Education and teacher management information systems (EMIS and TMIS) are crucial to collecting and managing data on teachers. However, there are many challenges to obtaining and using this information for decision-making. These include lack of time, financial resources and personnel capacity, low digital literacy, and difficulties in establishing online and integrated systems (↑Custer et al., 2018). For example, 81% of countries in sub-Saharan Africa still collect and input data into EMIS using paper records instead of sharing and inputting these files electronically

(↑Joseph, 2020). This can cause significant delays in data collection and processing, as well as perpetuate errors in data transmission, with serious implications for teacher deployment.

There is some evidence from low- and middle-income countries suggesting that technology can support more equitable and efficient teacher allocation. Case studies from Indonesia, Malawi, the Gambia, and the Philippines have shown the potential of using geospatial technologies to improve the efficiency and equity of teacher deployment (↑Asim, et al., 2017; ↑Patrinos & Kagia, 2007; ↑Nirwana et al., 2019). ↑Elacqua et al. (2021) note that in the majority of countries, teachers are hired using a decentralised approach; however, some education systems have adopted online centralised allocation systems, some of which use new technologies such as Artificial Intelligence (AI) and Machine Learning (ML) to improve the allocation process and its outcomes (↑Agarwal & Somaini, 2018).

In light of this evidence, the Global Education Evidence Advisory Panel (GEEAP) has highlighted an "urgent need" for research to show what can improve teacher allocation and how these changes affect teaching and learning (↑Akeyampong et al., 2023). This research seeks to address this urgent need and to better understand how changes to teacher deployment processes can facilitate more equitable allocation to support improved learning for all.

This paper is one of a series of research studies in the project on the *Impact of GIS-Supported Teacher Allocation in Sierra Leone* led by EdTech Hub and research partners Fab Inc. and the Learning Generation Initiative (see Table 1 above). In this study, we generate new evidence and insights from Sierra Leone, where the government has recently shifted to a centralised, tech-enabled teacher deployment process, which used a preference matching algorithm. This paper seeks to understand how these changes impacted decision-making on teacher allocation, while a companion paper (↑Koutecký et al., 2025) looks at the same process to understand the impact of the matching algorithm on equitable teacher allocation and other policy goals.

1.1. Teacher allocation in the Sierra Leone context

Teacher salaries are the largest recurrent item in the education budget in Sierra Leone (↑Wright, 2017). Yet, the education system has struggled to translate this investment into an effective teaching workforce, with very few teachers on the government payroll. In Sierra Leone, only 40% of teachers are on the government payroll nationally, meaning that volunteer teachers comprise a significant proportion of the education workforce and

are overrepresented in rural and hard-to-reach areas (↑UNICEF, Forthcoming b).

Today, policymakers aim to attain a pupil-to-qualified-teacher ratio (PQTR) of 40:1 (primary and junior secondary) and 35:1 (senior secondary) (↑Government of Sierra Leone, 2022; ↑MBSSE, 2021b).[2] A recent study by UNICEF's Teachers For All project (↑UNICEF, Forthcoming b) in Sierra Leone reports that the average PTR for government-approved primary schools is 47:1, and the PQTR is 90:1, with one in four schools with a PQTR exceeding 110:1 (according to 2022 EMIS data). The study showed that looking at the PTQR reveals that teachers are distributed unevenly across districts and from rural to urban areas. They report that schools in the most urbanised and economically developed districts have a lower PQTR of 46:1, while districts in the northeast and south—such as Kono (125:1), Falabla (122:1) and Kambia (121:1)—experience substantially larger PQTRs, often more than double that of the Western region. In addition, variation is often even higher within districts, with schools farther from a district headquarters having a higher proportion of unqualified teachers. Furthermore, localised teacher shortages disproportionately affect the poorest and most vulnerable children, with qualified teacher shortages concentrated in specific chiefdoms within districts (↑UNICEF, Forthcoming a).

In this context, EdTech Hub, Fab Inc., and the Learning Generation Initiative (LGI) have collaborated with the Teaching Service Commission (TSC) to provide technical support to improve teacher allocation and undertake a series of studies on key elements of the deployment process, including teacher preferences, teacher mobility, and retention nationally.

This series of research studies on teacher allocation[3] is part of the Hub-led research (HLR 3) project, which addresses TSC concerns about inequitable teacher allocation and movement. In one of the studies, it was found that between 2015 and 2021, a quarter of all teachers recorded in the Annual School Census (ASC) moved schools at some point, but there was little evidence of higher mobility from rural schools (↑Espinoza-Revollo et al., 2023). Most of the movement was between schools in the same areas and the same type of settlement. Over half of the teachers moved less than 5

[2] While the Policy Guidelines on School Approvals (2021) sets these PQTR targets for Level 2 Approval Criteria, the Education Sector Plan 2022-2026 sets the target PQTR for 2026 as 45:1 (primary and junior secondary) and 50:1 (senior secondary). Therefore, there is some confusion over official PQTR targets.

[3] See https://edtechhub.org/evidence/edtech-hub-research-portfolio/impact-of-gis-supported-teacher-allocation-sierra-leone/. Retrieved 13 May 2025.

km from their original location, suggesting a localised teacher labour market (↑Espinoza-Revollo et al., 2023).

The other study in this series on teacher preferences found that teachers' decisions to stay or change schools are related to a range of issues, including school working conditions, the distance of schools from teachers' homes, teacher relationships within and outside the school, infrastructure and access to basic amenities, opportunities for professional development, and monetary incentives and allowances, especially for remote and hard-to-reach areas (↑McBurnie et al., 2022b).

1.2. The intervention: A tech-enabled deployment approach

1.2.1. Previous deployment processes

Over the past several years, the TSC has worked to update and improve the teacher deployment process. Given that the government is unable to pay salaries for all existing teachers (↑Turrent, 2012), individuals who are teaching in schools but not receiving a salary from the government are considered volunteer teachers who are waiting to be placed on the government payroll (↑MBSSE, 2021a). In this context, previously, recruiting teachers involved identifying schools where qualified but non-payroll teachers could be formally hired and put on the payroll. Thus, this process primarily involved recruiting existing teachers to the schools where they were already teaching and did not require the government to allocate teachers across schools.

In a recent interview, Marian Abu, TSC Director of Teacher Management, explained that in 2019, the TSC undertook an allocation process, recruiting 2,000 teachers and assigning them to schools randomly. This process led to a backlash from parliamentarians and the public, as they could not justify the decision to deploy teachers to different schools. In 2020, the TSC asked the World Bank to help build a Teaching Service Recruitment Portal to remove the randomness from the deployment process. The TSC used the portal to receive 14,000 applications and then recruit 5,000 teachers (4,225 finally added to the payroll) based on factors like the number of trained and qualified teachers, the number of female teachers, and the needs of hard-to-reach schools (↑Mackintosh et al., 2020b). Mrs Abu reported that while the portal improved the process, it did not fully address all deployment challenges (↑Frazer, 2024).

Although recruitment numbers vary each year depending on government budgets, the World Bank continued to support the TSC in developing a Teacher Deployment Protocol in 2021, which was used in the 2022 recruitment process. However, political pressures from parliamentarians and the public continued to be applied, and opposition towards the data-driven process centred on a lack of understanding of how this was implemented and a lack of visibility of the outputs. For more information, see ↑Beoku-Betts (2023), which provides an overview and details of lessons learnt from the teacher deployment process before and during 2022.

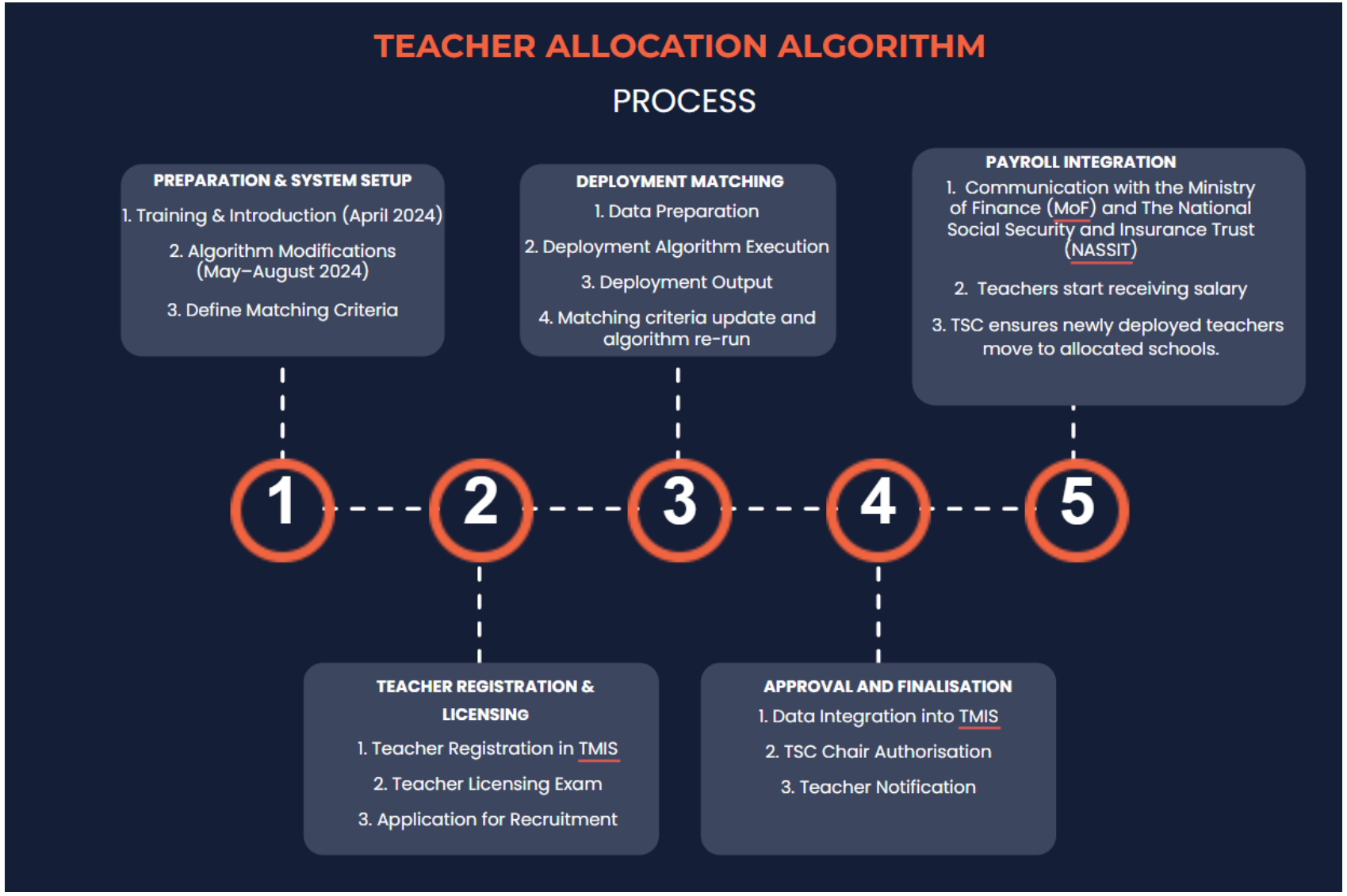
During this period, the TSC, supported by World Bank funding, began developing the Teacher Management Information System[4] (TMIS) led by CGA Technologies, to digitise many of the TSC's existing administrative actions and improve integrated digital information management across departments. Modules were developed for Registration and Licensing, Professional Development, Teacher Management, and a Grievance Redress Mechanism. Before this, teacher deployment decisions were made based on manually gathered data, which was often inconsistent and contained missing values, and errors.

The TMIS project included the development of a Teacher Licensing Exam App led by Fab Inc., which incorporated an existing bank of 1,600 teacher training questions across five subjects: English, Maths, ICT, Education, and Professional Standards. These were split across four levels depending on the qualification held by the teacher: Teaching Certificate (TC), Higher Teaching Certificate Primary (HTCP), Higher Teaching Certificate Secondary (HTCS), and Graduate Teachers (GT) for those with a Bachelor's of Education and higher. This digitised exam app ensured that the generation of exams was balanced in terms of difficulty and breadth of curriculum covered. A Teacher Licensing Exam was introduced in Sierra Leone at the beginning of January 2024.

Alongside this, Fab Inc., supported by EdTech Hub funding, had designed an open-source teacher deployment algorithm to support governments worldwide in strengthening workforce planning processes. This enables a user to flexibly incorporate their own criteria, including both school and teacher preferences as required, and to clearly visualise the outputs of the algorithm. This was developed to be used by any country, but as an illustrative example, the default settings were set up to implement the Teacher Deployment Protocol used by the TSC in 2022. The flexible nature of the algorithm meant these could be easily adapted to suit new criteria.

[4] See https://tsctmis.org/. Retrieved 13 May 2035.

Figure 1. *Sierra Leone teacher deployment process (2024)*



1.2.2. The 2024 recruitment and deployment process

For the 2024 teacher recruitment process, the TSC aimed to utilise the teacher deployment algorithm to conduct recruitment in a data-driven manner, while updating the process to incorporate new and evolving priorities. The first step in this process included Fab Inc. holding a number of in-person training sessions at the TSC in April 2024 to showcase the use of the algorithm and the flexibility it has to incorporate new priorities. These sessions included:

- A general session with TSC Senior Management, introducing the deployment algorithm, discussing potential matching criteria, and obtaining feedback.
- Five working sessions with the TSC Directorate of Teacher Management team providing hands-on training on the use of the algorithm, followed by running scenarios using potential criteria and gaining feedback on the use of the algorithm.

Responding to feedback on the use of the algorithm, such as incorporating an ability to work offline, modifications were made in May 2024. Then, throughout 2024, Fab Inc. continued to work with the TSC to react to changes in the numbers of licensed teachers and recruitment priorities, including meetings in August 2024 with TSC Senior Management and the Minister of Education.

The new deployment process included another important change beyond the introduction of the algorithm. Unlike previous recruitments, teachers were required to be qualified and also to take a licensing exam and pass, requiring a mark of at least 50%, before they were eligible to be put on the payroll and deployed to schools.

To do so, qualified teachers had to register with the Teacher Management Information System (TMIS). Teachers' personal identifiers and professional characteristics, such as level of education and specialism, are captured in the database, including verification of teachers' qualification certificates, ensuring that only qualified teachers may register in the system. The TSC then announced the dates for the Teacher Licensing Exams in districts, and TMIS-registered teachers were then able to book for these exams. Non-payroll teachers who passed the exam could then apply for recruitment on the TMIS portal, where they could express their preferred deployment school. The government undertook a public sensitisation exercise to alert districts and schools of the new process. Both TSC

Headquarters and district offices facilitated teacher registration on the portal and exams.

Previously, exams were paper-based, but in 2024, the exam was digitised and teachers took them on tablets. Teachers automatically received their exam results by email. If they passed, they were then asked to report to the TSC office to provide their social security, tax, and banking information so they could be put on the government payroll. The verified teacher data from the TMIS, combined with school data from the Annual School Census conducted by the Ministry of Basic and Senior Secondary Education (MBSSE), was then used for input into the deployment algorithm.

The deployment algorithm allows setting rules, preferences, and tie-breaks, and aims to allocate teachers onto the government payroll in a data-driven way to make teacher distribution more equitable both between the country's geographical areas (districts), and within these (across schools). The overall goal is to put the government's limited resources to their best use and provide better learning opportunities for pupils in the most marginalised contexts.

The output of the deployment algorithm, which can be visualised in the deployment tool as well as exported to an Excel file, is the suggested allocation in terms of the distribution of teachers to individual schools. This output then needs to be reflected in the TMIS, changing the school for deployment where it does not match a teacher's preferred school.

Once updated, the TSC Chair is required to do the final authorisation in TMIS. Upon authorisation of teachers to be deployed in the recruitment portal, teachers receive an instant email notification about the recruitment outcome, including information on the deployment school. Teachers then need to accept or reject the recruitment offer in TMIS. Simultaneously, the TSC communicates the list of teachers to be deployed to the Ministry of Finance and the National Social Security and Insurance Trust (NASSIT) to initiate the process of obtaining a PIN (personal identification number) code and requesting that the selected teachers be added to the government payroll.

It is important to note that at the time of data collection for this study (January 2025), not all teachers had received notifications, as the TSC had not completed the deployment and allocation process. They still needed to pass the output of the deployment algorithm to TMIS, and the TSC Chair needed to authorise the deployment, which triggers the notification. At that time, the TSC had only obtained the output of the deployment (an Excel file) and sent it to TSC district offices for district directors to post the

list at their office and communicate decisions to teachers and school leaders. Figure 1 above provides a high-level outline of the 2024 teacher deployment process.

Box 1 below describes the initial deployment criteria set by the TSC and how the algorithm worked within these parameters.

Box 1. *How does the teacher deployment algorithm work?*

The 2024 teacher deployment algorithm works by matching schools and teacher preferences within a set of rules/conditions and is set to give priority to schools in terms of their teacher needs. The magnitude of school need is defined by the pupil-to-payroll-teacher ratio (PPTR), such that **schools with no payroll teachers or the lowest number of such teachers relative to pupil enrolment are defined as the most marginalised**; thus, these schools would be prioritised in terms of teacher deployment. When allocating teachers to schools, the algorithm prioritises teachers with the characteristics most desired by schools in need (grade level they teach, specialism, etc.). Simultaneously, teacher preferences for school characteristics are considered in the matching process. The output of the deployment algorithm is the suggested allocation of teachers to specific schools.

What is the hierarchy of match settings?

1. Schools are prioritised in terms of need

Need is defined as the number of teachers needed to reach the national PPTR (for a given educational level). The schools with the highest need get teachers first.

Level	Distribution of student population
Pre-Primary	5%
Primary	60%
JSS	20%
SSS	15%
Total	100%

To incorporate district needs in the process, school-level PPTR was calculated for each district. These were normalised using the min-max method to create a school-level district weight. These weights were used to determine the share (and number) of teachers to be deployed to each school level by district out of the total quota of 2,000 teachers.

2. Rules (and valid pairs) are set

Set rules are the most powerful of the match settings and are followed at all times during the matching process (e.g., share of total teacher cap distributed across school levels; this cannot exceed the set threshold).

The same holds for valid pairs. These include 'match key', which restricts possible matches to pairs of 'schools–teachers' according to defined joint characteristics (e.g., a teacher with a specific school level preference will only be considered for deployment to the desired school level), and 'radius' which uses latitude and longitude values to enforce that a match can occur between

schools and teachers within a given radius of each other (e.g., 3 km to minimise travel time).

3. Preferences are set

School preferences are selected from teachers' attributes (e.g., schools prefer teachers with higher teaching qualifications). Teachers' preferences are school attributes (e.g., teachers list a school EMIS code).

4. Tie-breaks are solved

If there are multiple teachers who could be assigned to a particular school, a tie-break is needed to determine who gets deployed (e.g., schools would prioritise the hiring of female teachers if there was a tie between a male and a female teacher).

What were the initial criteria set for teacher deployment in 2024?

The TSC intended to add a total of 2,000 new teachers to the government payroll. A separate set of 1,000 pre-primary teachers was to be hired using Global Partnership for Education (GPE) funding, and 1,238 additional teachers were to be added to the government payroll through the redeployment fund (i.e., positions opened up due to retirements or deaths). **The description below provides details of the deployment of the 2,000 primary and secondary teachers only.**[5]

The following initial criteria were agreed upon and set with the TSC. The criteria listed below in orange signify modified criteria. The deviations and the final criteria are detailed in Annex 1.

Rules and valid pairs

- The teacher quota will be distributed to individual districts as guided by the PPTR across districts in an effort to smooth out inequalities between districts.
- The teacher quota will be distributed as per the following shares. These were relatively equivalent to the distribution of pupil enrolment across these school levels.
  - Pre-primary: 5% (or 100 teachers);
  - Primary: 60% (or 1,200 teachers);
  - Junior Secondary: 20% (or 400 teachers);
  - Senior Secondary: 15% (or 300 teachers).
- Teachers would be deployed to non-private schools that have been approved for financial support for a minimum of three years.

[5] This turned out to be a deployment of 2,341 teachers, as explained below.

- Teachers would be deployed to schools within a 3 km radius of their current teaching location.
- Unqualified teachers will not be recruited.
- Only qualified teachers who pass the Teacher Licensing Exam would be eligible for deployment on the government payroll. Three rounds of licensing exams were administered in 2024 across all the country districts, aiming to ensure that teachers hired on the payroll meet the minimum level of standards. By default, this was the strictest rule imposed on teachers, as teachers who did not pass the exam would not be considered.
- Teachers teaching at a particular school level will only be assigned to that school level.
- Teachers who prefer a school of a particular religion will only be assigned to schools of the same religion; for example, those teaching in a Christian school would be deployed to another Christian school, not a school of a different faith.

Preferences

- More remote schools will be prioritised
- Female teachers will be prioritised

Tie-breaks

- Priority will be given to higher qualified teachers (Teachers Certificate < Higher Teachers Certificate Primary < Higher Teachers Certificate Secondary < Bachelor in Ed. < Post Graduate Diploma in Ed. < Master's / PhD in Ed).
- Priority will be given to teachers with longer service

2. Study overview

The overall project's first study examined teacher preferences—the factors that shape where teachers want to work. In doing so, we identified some aspects of why the inequitable distribution of teachers persists in Sierra Leone (↑McBurnie et al., 2022b). We found that various factors, from financial incentives to school conditions to relationships with the community and colleagues, influence teachers' decisions to remain or move to specific schools.

After exploring what motivates teachers to remain at or change schools, we used longitudinal administrative data to understand teacher mobility nationally, exploring what types of teachers move to different schools and where they move to. This study addressed concerns that teachers in rural areas often relocate to more favourable locations after being added to the government payroll. Again, as noted above, we found evidence of a localised labour market, with over half of those who moved staying within 5 km of their original schools (↑Espinoza-Revollo et al., 2023).

2.1. Research question

In the final phase of this research, we aim to identify if and how the latest iteration of the teacher deployment process in Sierra Leone (2024) impacts the government's goals around more equitable allocation. To do so, two separate but related studies were undertaken simultaneously. The first study of this final phase looks at how the teacher deployment algorithm impacts the actual distribution of teachers and the extent to which it supports the TSC in meeting its policy goals and priorities around teacher allocation (↑Koutecký et al., 2025). This second study, covered by this paper, aims to understand if and how the new deployment process enabled by the algorithm affects the government's decision-making process.

Given this objective, **the primary research question for this study is:**

What is the impact of tech-enabled teacher deployment on education decision-making?

This involves looking at the intersections of different deployment elements, including:

- New recruitment requirements (i.e., passing the teacher licensing exam)

- The introduction of newly digitised data and systems (i.e., teacher licensing and registration)
- The data-enabled tool (i.e., the algorithm)
- Policy goals and criteria (i.e., preference for female teachers and more qualified teachers).

The influence of these factors is explored against key features of decision-making, namely, those related to the **institutional context,** which includes **norms, behaviours and roles, power and relationships, and resources and capacities**. These features are further elaborated in Section 3. Based on the government's previous challenges with deployment, we look closely at certain aspects of these features, including **changes to the efficiency of the decision-making process** (norms and roles) and whether the algorithm influences the **government's ability to communicate and justify deployment decisions** (power and relationships) in any way. Table 2 below outlines the key features of the research question.

Table 2. *Key features of the research question*

Updated teacher deployment process: Key elements	Government decision-making: Key features	Aspects of decision-making features of key interest
Newly digitised data and systems (i.e., teacher licensing and registration)	Norms, behaviours, and roles	Efficiency of the government's decision-making process
Data-enabled tool (i.e., the algorithm)	Power and relationships	The government's ability to communicate and justify deployment decisions
Policy goals and criteria (i.e., preference for female teachers and more qualified teachers).	Resources and capacities	

2.2. Conceptual approach

To explore the impact of the new deployment process (including the algorithm) on decision-making, we used the conceptual framing presented in ↑Custer et al. (2018, p. 4). This framework outlines a **cycle of data generation, use, and impact** and posits that the process of moving from data generation to use, and ultimately to impact on education outcomes, "is not simple, automatic, or quick. The seemingly straightforward story of information supply, demand, and use is

complicated by the **institutional context**." This includes factors such as **users' norms, behaviours, and roles** (how they prefer to make decisions), **power and relationships** (who they know and trust, formal and informal decision-making structures), and **resources and capacities** (capacity to maintain data systems, their confidence and capability to turn data into actionable insights). These elements shape different institutional operating environments that may incentivise or dampen efforts to make decisions based upon evidence. ↑Custer et al. (2018) argue that government actors must generate accurate data, interpret it, and then link it to the roles that they play in the education system (↑Coburn et al., 2009). Only then can they use the data to inform specific decisions regarding how to allocate resources, set policies and standards, or make course corrections.

Although the generation of data, including its quality, management, and accessibility, is a prerequisite, this study focuses primarily on the use and impact stages of the framework. The factors influencing institutional context were used to guide the research framework and protocols.

2.3. Methodology

This section summarises key aspects of this study's methodology, including the approach, sampling, data collection, and data analysis.

To address the urgent need for research on how to improve teacher allocation, this study used a qualitative approach to explore how the new teacher deployment process, including the algorithm, influences the government's decision-making process on teacher allocation. As discussed above, we consider themes emerging from the literature as captured by ↑Custer et al.'s (2018) conceptual framework, including impact on power and relationship dynamics, decision-making norms, behaviours and roles, and capacity and resources. Based on the government's previous challenges with deployment, we look at specific aspects of these features, including changes to the efficiency of the decision-making process and whether the algorithm influences the government's ability to communicate and justify deployment decisions.

We collected qualitative data from stakeholders at different levels of the education system, as different actors have held competing and overlapping responsibilities for teacher deployment since the devolution of education service delivery in 2004 (↑Education Partnerships Group, 2020). We undertook 35 semi-structured interviews with:

- Central government policymakers involved in teacher deployment (e.g., TSC Director of Teacher Management, Director of Teacher Licensing);
- All TSC District Directors;
- A sample of teachers and school leaders from six schools in one district.

We chose to select schools from Western Rural district as data showed it was the most disadvantaged in terms of learning outcomes and PQTR. We then created a list of schools in that district that the algorithm had suggested receive payroll teachers as part of the 2024 deployment (a total of 111 schools). To understand how deployment priorities were impacted, we then restricted the sample to 15 schools which had received the most teachers and had a gender balance (at least one male and female teacher). For rural schools, we included those with a gender imbalance, as no two schools met the criteria. From this list of schools, six were selected that represented:

- A mix of school levels (i.e., two primary schools, two junior secondary schools, and two senior secondary schools)
- A mix of locations (i.e., two rural, two peri-urban, and two urban)
- A mix of teachers' preferences for deployment to a particular school (i.e., two schools preferred by three teachers, two by one, and two by none)
- A reasonable gender balance (i.e., eight female teachers, ten male teachers)

Tables 3, 4, and 5 below provide further details on the stakeholders interviewed.

Table 3. *Central government policymakers*

Government agency	Number of Interviews	Participant role
MBSSE	1	■ Delivery Unit, MBSSE
TSC	6	■ The Chairman, TSC ■ Secretary, TSC ■ Director of Teacher Management, TSC ■ Deputy Director of Teacher Management, TSC ■ Director, Teacher Development and Performance ■ Senior Payroll Verification Officer, TSC

Table 4. *District directors*

Government agency	Number of interviews	Participant role
TSC	15	District directors ■ Western Area Urban ■ Western Area Rural ■ Bombali ■ Falaba ■ Koinadugu ■ Tonkolili ■ Kambia ■ Karene ■ Port Loko ■ Bo ■ Bonthe ■ Moyamba ■ Pujehun ■ Kailahun ■ Kenema

Table 5. *Schools*

Name of School	District	Number of interviews	Level	Role	Gender
School 1	Western Area Rural	1	Secondary School	Deputy Headteacher	Male
School 2		2	Secondary School	Headteacher	Male
				Teacher	Male
School 3		4	Primary School	Headteacher	Female
				Teacher #1	Male
				Teacher #2	Female
				Teacher #3	Female
School 4		3	Secondary School	Principal	Male
				Teacher #1	Male
				Teacher #2	Female
School 5		2	Primary School	Headteacher	Female
				Teacher	Male
School 6		1	Secondary School	Principal	Male

Participants were provided explanations of who was in the research team, the purpose of the study, and how their data would be used and managed. They were required to sign consent forms to participate. During the study, we recorded and transcribed all interviews which were conducted in English.

The semi-structured interviews were composed of two primary areas where participants:

- Answered questions on the perceived impact of the teacher deployment algorithm on the decision-making process; this covered the elements of institutional context described earlier in this section and also allowed for responses not covered by those factors.
- Described the teacher deployment process from teacher registration and the licensing exam to communicating deployment decisions, highlighting challenges, differences from previous recruitment cycles, and recommendations for future deployment.

We thematically analysed the data in Atlas.ti, using a hybrid approach that combines deductive and inductive coding to interpret the data (↑Fereday & Muir-Cochrane, 2006). Inter-coder validity was checked for the three researchers undertaking the analysis. The deductive coding scheme was based on the topic areas identified in the interview protocol, while the inductive coding identified new emergent themes from the interview transcripts. The codes used for each category are listed in Table 6. Together, these approaches supported the identification of the key messages sourced through an iterative process.

Table 6. *List of inductive and deductive codes*

Deductive codes	**Inductive codes**
Administrative burden: negative	Deployment and retention concerns
Administrative burden: positive	District needs
Capacity	Impact on teachers
Communication of decisions	Recommendations/feedback/ questions
Deployment priorities/goals	Taking into account teacher preference
Description of deployment process/changes to deployment process	
Issues with algorithm or wider deployment process	
Meeting policy/deployment goals	
Relationships/power dynamics among different roles	
Role in deployment process	
Transparency/accountability/fairness	
Use of algorithm next year	
Why use the algorithm	

3. Findings

This section presents the main findings aligned with the two primary areas of the interview protocol outlined above. Section 3.1 describes findings related to the impact on the decision-making process, while Section 3.2 focuses on participants' mapping of the deployment decision-making process, including the issues and recommendations they reported.

Under Section 3.1 we discuss:

- Implications of digitisation and technology in deployment: efficiency, cost saving, and system capacity to manage new technological requirements (3.1.1).
- Shifting power dynamics in more centralised, tech-enabled deployment: accountability, transparency and political interference (3.1.2).
- Consequences of inconsistent communication: confusion, backlash and limitations to justifying decisions (3.1.3).

Under Section 3.2 we explore insights on tech-enabled deployment, including:

- Challenges with the new deployment process (3.2.1).
- Impact of new deployment process on meeting policy goals (3.2.2).

Section 4 makes recommendations for future deployment and use of the algorithm.

3.1. Impact on the decision-making process

This section discusses the key findings related to participants' perceived impact on the government's decision-making process for deployment. These are categorised under three primary insights:

- The implications of digitisation and technology in deployment: efficiency, cost saving, and system capacity to manage new technological requirements.
- Shifting power dynamics in more centralised, tech-enabled deployment: accountability, transparency and political interference.
- Consequences of inconsistent communication: confusion, backlash, and limitations to justifying decisions.

3.1.1. Implications of digitisation and technology in deployment: Efficiency, cost-saving, and system capacity to manage new technological requirements

The digitisation and technology involved in the new deployment process positively influenced several key aspects of the decision-making process, including efficiency and cost saving. It also had implications for education stakeholders' capacity to manage the new system's technological requirements. Similarly, challenges to the sustainability of the new decision-making process were raised, given insufficient capacity and training.

Efficiency and cost savings

Participants noted that the transition to digitised data and an online teacher deployment system has led to several significant improvements in the decision-making process. Before the implementation of the algorithm, teacher deployment decisions were made based on manually gathered data, which participants said was often inconsistent, missing information, and contained errors.

Many TSC district directors and HQ officials acknowledge **the greater ease and accuracy of record-keeping with the new digitised data and online system, reducing the risk of missing documents, inaccurate information, and manipulation of data.**

> *"*[...]*this one [the current deployment process] took longer. This one took longer. But it's fine because we are getting accurate information from the teachers. Because that one [the previous recruitment and deployment process], it was paperwork. You come and fill the ED form. Sometimes your ED form we got missing. There are teachers who do not have records. But this one now, the moment you get a PIN code, we have a record for you. You just have to go to the system and get your information."* (District Director)

Multiple TSC HQ and district staff cited **benefits relating to the cost-saving aspect of digitisation in terms of time and resources**. They highlighted how the previous manual data-collection process required extensive printing and paperwork, travel, and administrative overheads, all of which have now been significantly reduced. Participants noted that previously, the process of teacher deployment required months of back-and-forth documentation corrections, which consumed a lot of time and resources. Additionally, the TSC Chair was required to physically sign

every teacher registration form (ED form) by hand. This is no longer required given the digitisation of the system.

> *"Time management, of course. Less costs, of course. We were able to manage our time. We spent less money doing it. Like when we did the last recruitment manually, we spent like six to seven months in the process. Back and forth, back and forth. Bring this out. Return it. It's not correct. Go and redo it. Come back. So we spent a lot of hours and a lot of resources went through that. So with this now, the resources, we've been able to manage. The time, we've been able to manage. The manpower needed was less."* (TSC HQ Official)

> *"And that is one of the areas of efficiency, you know, with a click of the button, you know, everything is approved and things like that is now online. But before you have to, you have to, you have to sign every ED form. You know, even if you had thousands of ED forms, you have to sign all of them and that has now been removed, and it's done as quickly as possible."* (TSC HQ Official)

The time-saving aspect of digitisation was, however, contested by many participants. For instance, examples were given of how additional time had to be spent establishing the system and resolving inconsistencies across teacher data from different sources. From participant responses, it appears that **initial digitisation of the system shifted where the TSC's time was needed**—from manually collecting data and travelling to districts to establishing the online system. One TSC HQ official noted that in the future, once the system is well in place and understood, it could make the decision-making process much faster.

> *"The previous year was more straightforward because, you know, you know where the teachers are. No effort was made to actually move teachers from one school to the other. You know, where you were was where you stayed. So it was more straightforward and much quicker, but it was more cost-intensive than it is now. You know now all this is done online. You do not have to move. Headquarter staff do not have to move, you know, to go, to go up country, to do this because it used to take a lot of long hours and a lot of money to achieve. So it takes, sorry, actually shorter, a shorter period to do that because I don't know, in the future, once people get to understand the system, the online system, and the distribution, the new deployment policy, once people get to understand that, you know, then it can be much quicker than doing it manually."* (TSC HQ Official)

Capacity to manage new technological requirements

One issue with moving to a digitised system acknowledged by the TSC was **the difficulty some teachers faced in adapting to the new licensing exam's technological requirements**. Although this was not technically part of the deployment process, it was a critical first step to getting the data required by the algorithm. The exam process was digitised entirely, starting with the registration and booking of the exams all the way to the communication of the results. One teacher recounted their surprise at taking the digital licensing exam:

> *"I was thinking that the exam would have been on a paper like that, but all of a sudden, I noticed that it was done through technology."* (Teacher)

The TSC acknowledged that **some teachers struggled with low digital literacy**, leading to mistakes during the licensing exams, which were conducted on tablets. As a result, many candidates failed their exam because they were unfamiliar with the testing platform. A three-minute video titled 'How to use the TSC Teacher Licensing Exam App in seven simple steps' was developed for sharing on WhatsApp to try to ease this challenge. Despite this, not enough non-payroll teachers passed the exam in the first round in January and February 2024 to meet the number intended for recruitment. So, two further rounds of exams were held between June and August, which delayed the deployment process.

A fundamental issue affecting the algorithm's effectiveness was **the accuracy of teacher and school-level data**. Cases were reported where schools with the same name received duplicate teacher assignments, while others were overlooked entirely. Additionally, outdated payroll records led to misallocations, with teachers assigned to schools where they were no longer present. District directors said there was a need for improved data verification and real-time updates to ensure the system reflects actual staffing and needs. While the use of an algorithm introduces efficiency and equity in theory, district directors emphasised the necessity of human oversight in the final stages of deployment, arguing that a review process should be implemented before finalising placements. This would allow for corrections to be made where the algorithm's recommendations do not align with local realities.

A serious issue was also raised regarding the technical capacity required to run and manage the system. **Many TSC officials acknowledge that while training sessions were provided on how the algorithm works, they were not comprehensive enough to build internal capacity for**

algorithm management. One TSC official expressed frustration over the lack of clarity on who manages the system internally. Additional training was emphasised in relation to **concerns about sustainability due to reliance on technical partners who developed the algorithm**. This included a school leader who voiced worries about sustainability and whether the TSC would be able to continue to run the algorithm themselves if funded externally.

> *"We spoke about what we want, the variables. We spoke about the advantages and the disadvantages. We spoke about how it will work. You know. What I am always asking for when the project stops and these players are gone. But training is not enough for us. We cannot do this work. So maybe we need more vigorous training and more physical that we can meet and say, okay, you push this button in, and you bring this button in, then you can achieve this."* (TSC HQ Official)

One TSC HQ official emphasised the need to **build knowledge about the algorithm's functionality beyond TSC HQ**, specifically for district leaders and school heads.

> *"I think our DDs should be trained, of course. They are our forerunners in the district. The use of the algorithm system itself, and the use of technology for heads of schools and principals, as well. I think they need training because they are the ones who are at school level. They will be able to explain better to the teachers. For example, if we want to talk to the teachers, we talk to them through their heads. Through the DDs, and the DDs talk through their heads, and so on. So, those two sets of people, I think they need to get a clear, clear picture of what happens and how it goes around. Because that will be able to help us a great deal. Because one principal might be dealing with over 30 teachers."* (TSC HQ Official)

However, despite this recognition, many district directors and school leaders report limited or no direct training on how the algorithm works, and only general explanations of policy priorities and the updated deployment process. This was especially pertinent for district directors, many of whom did not know how to explain the algorithm output, illustrating breakdowns in communication about the deployment process to teachers and school leaders.

The TSC raised **the issue of the sustainability of the algorithm and new process,** with one TSC HQ official noting potential **challenges with the reliance on donors and external partners** and emphasising how it is

crucial that the TSC knows how to run the algorithm independently, given that previous support from the World Bank (on the initial version of the algorithm) ended without the TSC having the capacity to use the tool.

> *"The TSC, the staff, the DDs, the teacher management directorate, because at the end of the day, let's not say, oh, the World Bank is gone. They said they are not helping us again, and we cannot do this thing. That was the problem we have in sending data to the World Bank. We want us to be trained by Fab Inc., so we know when they are gone next year, next year, next year, we can do the work without them."* (TSC HQ Official)

3.1.2. Shifting power dynamics in more centralised, tech-enabled deployment: Accountability, transparency, and political interference

The introduction of the new deployment approach driven by the algorithm shifted teacher allocation from a more decentralised to a centralised approach. This significantly influenced power dynamics in the decision-making process, disrupting previous roles and norms and changing accountability hierarchies.

This disruption was seen as having both positive and negative aspects. Respondents at all levels strongly suggested that the new process increased transparency and helped combat political interference (i.e., those in positions of power unfairly influencing decisions) and preferential treatment, but at the school and district level, it created confusion and tension around the roles of certain stakeholders in the decision-making process.

Disrupting existing decision-making roles and norms

This study found that previous deployment processes received pushback from some in Parliament, who perceived deployment to be unfair and biased. Respondents reported that at the central level, the TSC Chair leads on communicating the deployment process to Parliament and the MBSSE. For this deployment round, the TSC staff said they **involved Parliament in every step of the process, holding discussions with the speaker, permanent secretary, and MPs to explain the new process and how the algorithm aimed to provide a more transparent and equitable approach**. At the time of data collection for this study, no further discussions had been held between the TSC and Parliament on the actual deployment outcomes.

At the level of the TSC, **the new deployment requirements drastically altered the locus of decision-making on recruitment and deployment**, which created some confusion and tension in the relationship between the different levels of the TSC and between the TSC and schools. Previously, district directors received quotas from TSC HQ for their districts. They then undertook the replacement of non-payroll teachers with payroll teachers, primarily filling vacancies in their schools with non-payroll teachers who had already been volunteering there as teachers. For the new deployment process, district directors had no active role in terms of selecting teachers or deciding where they would be placed. In this deployment, teachers had to pass the exam to be eligible for recruitment, and then the algorithm deployed them to schools from the TSC HQ level. While some district directors said they were informed of the new policy and process, they were not consulted about deployment decisions.

Several district directors communicated that they had rich, local knowledge of school needs in their districts and that this is important information that should be fed into the algorithm or checked against the data the algorithm outputs. District directors emphasised that they are an important part of the deployment process and the main sources for current, on-the-ground information about schools and teachers. They felt they should be consulted and involved in the deployment process.

> *"[...] trust me, you* [the TSC] *will not know which one of the 900 schools are actually in dire need of teachers, as compared to me, who is on the ground. And so when it comes to preferred schools for allocation, we will want a system wherein we will be consulted around this, and our opinions are supposed to be taken on board."* (District Director)

> *"[W]e should be at the centre stage as Deputy Directors. We mend our districts. We know where there is teacher demand. We know where we need science teachers most. Subject teachers for secondary schools, for primary schools, we know where we need teachers most, so we would give our opinion on that, or we send the list—they will go to verify if what we have said is different from what they get."* (District Director)

District directors and school leaders mentioned that the utilisation of human judgement at the local level could have prevented some of the deployment issues. While the algorithm assigns teachers based on a national level assessment of school needs, teachers and school leaders argue that it does not consider important human factors such as language barriers, cultural differences, or personal preferences that may affect

teacher effectiveness in a particular school. For example, a teacher may be assigned to a district where they do not speak the dominant language, making integration difficult.

> *"You can ask the computer a step-by-step process, and the computer will answer you, but what the computer tells you cannot be the prevailing situation in your district* [...] *for instance, teachers, they have been rotated within the district, we can understand even within the district, we can also look at from which junction. For instance, Moyamba district is now the largest district. If you are transferring somebody, so, for instance, from the chiefdom called Ribbi to Upper Banta, that person doesn't understand. One, there is going to be some communication gap, Ribbi is more of Temne and the other languages. If you go to Upper Banta, that there* [is] *purely Mende* [...] *so instead of actually helping, we are creating more gaps."* (District Director)

Changing accountability structures

The more centralised deployment approach **changed existing accountability from a structure of shared responsibility between the TSC HQ and districts to one where the TSC HQ is solely responsible for deployment decision-making via the algorithm**. District directors emphasised that under the new system, they have no accountability for teacher allocation since they were not part of the decision-making process. They spoke of both positive and negative aspects of this shift in the accountability structure. On the one hand, district directors noted that they can no longer be blamed for deployment decisions that are unfavourable for schools, teachers, and communities. A few said they can more easily communicate and justify decisions by pointing to the algorithm and explaining that teacher placements are based on school needs. However, quite a few district directors emphasised that because they did not understand how the algorithm worked, they could not even explain to teachers and headteachers how the decisions were made.

> *"But I believe, first, we are the primary source of every information that has to do with teachers. So, the district really needs to be involved in every programme, in every process, activities that they want to undertake. Before you can go to national, national is just like a policy dialogue. But when it comes down to the district, practically the district has to be involved in that one. So, in the area of communication, they have to be effective in doing that one. So that we are aware."* (District Director)

Increasing transparency and combating political interference

Almost all TSC HQ respondents noted that the new requirement for teachers to pass licensing exams, coupled with a centralised approach enabled by the algorithm, led to increased transparency and helped to combat political interference.

Transparency was one of the most frequently reported reasons given for using the new deployment process. Respondents noted that previously, the TSC had been accused of bias and a lack of transparency in deployment. With the new process, the TSC notes that they can simply reference the online system to show what has been done by whom and justify decisions. One respondent noted that this is true at both national and district levels and emphasised that **it is harder to challenge the decision made by a computer than an individual, as you can show the data and exactly how allocation is decided**. A TSC HQ respondent referenced the online system as 'scientific' as compared to the manual process, while officials reported that the algorithm is more 'objective'. A few (at least four) respondents noted that transparency was enabled because the 'human factor' had been taken out of the deployment process. While this was not well explained in most cases, it appears that respondents were referring to the fact that no one individual can make decisions on recruitment and deployment. Interestingly, one respondent noted that the data can, of course, still be challenged as humans make decisions behind the system.

> *"It was all subjective, oh, I should have more teachers than the other district. So we decided that it* [...] *wasn't very transparent. People were accusing the TSC operatives of biasness, lack of transparency, and all of this, so to avoid all of those, we said, let us use technology. You know, once you have data that can improve on, there is no subjectivity about that. You know, it is there, it is scientific. You see the data that has been allocated and why it has been allocated using the algorithm. So you're not going to accuse anyone of playing games with it. So that was why we said let us use technology, instead of using the human factor to do this deployment."* (TSC HQ Official)

At the district level, directors also reported that the TSC undertook the new process **to combat bias in deployment and ensure a more impartial approach.** They agreed that using the algorithm is more objective and that even those in senior management positions could not influence deployment decisions under the new system. One respondent noted that

this creates more equal opportunities for teachers in recruitment and deployment.

> *"I think the Teaching Service Commission used the algorithm because* [...] *they think going digital is a way of justifying our actions because a lot of people cry foul on the actions of TSC, even when our recruitment was paper-based, using the ED forms and things like that, everybody was thinking that if you are not connected to TSC, or if you do not have money, you will not be recruited. So for me, I think, we, the decision to go algorithm is to save a lot of misconceptions and misgivings, but at the same time, we are of the view that whatever decisions come out of the algorithm are decisions that are stemming from objective from objectivity and without pointing fingers at somebody being biased."* (District Director)

TSC HQ officials noted that there has always been significant pressure from political leaders on the TSC at national and district levels. Many examples were given of MPs or community leaders asking for additional teachers for their districts or recruitment of friends, family, and constituents. The TSC notes that now, if MPs or ministers try to influence recruitment or deployment, they simply cite the exam requirement and explain that once an individual passes the exam, the algorithm will deploy them.

> *"Before this time, a parliamentarian would come to negotiate, and we would do our best, but this time we are using a digital platform to have these teachers distributed. If your constituency or your district, or your ward benefits, it's fine. But if they don't benefit, they wait for the next one. So, in fact, it's reduced the political interference, especially the exams. If you are very close to the politician, you have people who come to them and come to plead* [...] [but now] *your candidates that you are recommending, have the candidates passed the exams? Oh, no, wait, let me call them and check, let me check. So these are some of the things that reduce political interference. The moment you say, let the teacher go and see the exams, if the teacher passed the exams, you free the Commission from political interference."* (TSC HQ Official)

District directors also note that the new process has resulted in less corruption and preferential treatment, and taken off the pressure of constituents trying to influence recruitment decisions.

> *"We, as education actors, we have so much pressure normally, when it is entirely into our hands to determine who comes, look at a list, determine who is to come, do the vetting, and these kind of things, we have pressures coming from all angles—stakeholders,*

> *paramount chiefs, people you cannot say no to will come, and maybe you have* [...] *my district, the last recruitment I did, I have a space for to recruit 55 teachers to be selected from over 890 schools to be selected from over 2,000 candidates waiting to be recruited. And I was given 55 spaces. So imagine the paramount chiefs calling me, the ministers calling me, the stakeholders, my parents, people who think they are connected to me. Everyone has their own version, as long as you are not fortunate to be in that 55."* [District Director]

At the school level, school leaders and teachers explained that they felt the new **registration and exam process is more transparent,** with one teacher reporting that it "doesn't allow you to cheat the system." One teacher believed the process to be fairer as the exam focuses on competencies.

> *"I don't have a problem with it, really. I'm well satisfied. Because, first of all, for people to take exams, because maybe some people they are not really qualified for the job. But when you go through the examination, and you pass the exam, and then you apply now for the job, then when you come to the field, you'll be able to do a perfect job. So I think this one is perfect. I don't have a problem with it, really."* (School leader)

In the past, teachers did not need to pass the licensing exam to be eligible for recruitment, so the standard of teaching quality remained unverified. By introducing the exam requirement and algorithm, the TSC reported that it **aimed to ensure qualified teachers were recruited in a standardised way**.

> *"We need to take into consideration that in previous years, we didn't need, we didn't need to pass an exam, you only have to be in school teaching, and then you apply, you do the ED form, you apply, and then you go in there on recommendation, you were processed. You know, but there was a lot of uncertainties with that particular system. There were people who were recommended wrongly."* (TSC HQ Official)

The TSC and district directors reported that the algorithm was used to help **promote gender equity and inclusion**. Historically, the teaching workforce in Sierra Leone has been predominantly male. Currently, female teachers make up less than one-third of the teaching workforce in government-approved schools (↑UNICEF, Forthcoming a). The algorithm provides an approach that more transparently documents the TSC's efforts on this policy priority.

> *"So the algorithm we also look at female teachers we give preference to female teachers, we could at least be able to achieve the equity although for now, we have more men than women in the teaching workforce so we are consciously trying to see how we will improve so we have positively discriminated to attract more women into the profession."* (TSC HQ Official)

3.1.3. Consequences of inconsistent communication: Confusion, backlash, and limitations to justifying decisions

Lack of clarity on what communication actually took place

Communication was one of the most prominent themes in the challenges reported around the new deployment process. TSC HQ staff note that public sensitisation on the new deployment process was undertaken at district and national levels before deployment. The district directors were expected to communicate information on the new process to school leaders and teachers. However, **it is unclear what types of communication actually took place, as respondents at all levels reported varying degrees and types of communication activities**. A TSC HQ respondent reported that online training was provided, with DDs reviewing the algorithm variables, providing demonstrations on how it worked, and explaining the thinking behind it and its relevance. Another TSC HQ official stated that district directors visited the TSC office, where the TSC guided them through the process, demonstrating the completed steps. A few TSC HQ respondents noted that they were supposed to ensure every district director understood the reason why deployment was being done differently, but that the communication was not sufficient. TSC HQ and district directors noted that **the time available for sensitisation activities was very short, making it challenging.** A few recommended that additional communication and wider sensitisation needed to be done before the next deployment.

> *"Yes, popularisation was done, of course, with our district teams, and they, in turn, were expected to be able to disseminate the information across and to tell our teachers that this is not business as usual. The recruitment is taking another form, and so that is how it is. Yes, somehow, I will say it might not have been adequate, but somehow there has been some kind of communication."* (TSC HQ Official)

> *"The district directors are part of this information sharing. But every time you have a new idea, introducing the idea, testing the idea, implementing the idea within a short period, less than one month, it has a challenge. Even to understand the process, it has a*

> *challenge. So it would be rather good to at least, before we enter into the next, let's have a broader information sharing, if possible, training, sensitisation to see how best next year's deployment will look like. Taking into consideration all these lessons learned. But the period, the timing was very short, I must be honest."*
> (TSC HQ Official)

Some district directors mentioned that they were well aware of the new teacher registration, exam, and licensing process. However, they seemed to have varying knowledge of the deployment process itself. One noted that there was a press conference in Freetown when he happened to be there, which provided information on the new process. Some noted that they were aware of the new policy, but only a few knew that deployment would be done using the algorithm. Some district directors stated they were unaware of the new process beyond registration and exams.

Even when district directors reported that they knew about the new process, they expressed concern about the quick implementation of the deployment. A few district directors noted that they were unaware that deployment had started until the list of deployed teachers was shared with them, requesting additional information from teachers, such as their NASSIT (social security/pension number). Most district directors said they received a list of teachers and their school placements from TSC HQ and a notification that an algorithm was used for the deployment. The TSC HQ confirmed that district directors were sent the list and asked to alert teachers and post the list at their offices for teachers to review. One district director noted that since the list was shared, there had been no communication on the next steps from TSC HQ, illustrating a focus on the algorithm and not the process supporting it and actual deployment.

Some TSC HQ staff noted that sensitisation about deployment was not sufficient, and that more should have been done to communicate and explain the process. After school placements were sent out, they acknowledged that there was backlash from teachers and school leaders who were upset with the results. They had to discuss the deployment process with them and district directors, explaining how it worked and convincing them why they felt the system was more equitable.

> *"They should have made something like a workshop to sensitise heads of schools. This is the new system, this is what the government will do, this is what they are going to do, teachers' deployment to the school. I think I should have got that clue that this is what is happening, but I don't know anything."*

(School leader)

> *"The issue was we were so involved, you know, we were thinking so much about how it will work, rather than actually explaining the system, you know, the algorithm, to the people, you know, so the people didn't understand. That was why they came back the way they did. But once we started explaining to them, they understood."* (TSC HQ Official)

Managing backlash and justifying deployment decisions at the school level

As discussed in Section 3.1.2, district directors believed that they should have been consulted about the deployment decisions, as they have information that they believe the algorithm does not take into account. One mentioned that **consulting district directors could have prevented some of the issues with initial deployment and backlash from teachers and schools.**

Communication of school placements to teachers and school leaders was undertaken by district directors, who posted the lists of teachers and their placements at their offices, as instructed by TSC HQ. Most school leaders said they were not informed about the deployment process before the lists were posted, although one said the TSC visited their school to discuss it. **School leaders communicated dissatisfaction and concern about teacher placements to the district directors, some of whom raised the issues with TSC HQ.**

Critically, some district directors were unaware of the new deployment process, **which prevented them from answering questions from teachers and school leaders about how teachers were placed in schools.** This was a significant issue, as one district director emphasised: "*We need to be aware of the process. It is very embarrassing that they are asking questions we cannot respond to it.*"

Several district directors noted that effective sensitisation was conducted regarding teacher registration and exams, but not regarding deployment. They suggested that **if teachers had been made aware of the deployment policy beforehand, it might have facilitated their willingness to move to new schools, as they would have expected it and understood the rationale behind the TSC's decision to deploy them to another school.**

> *"If the DDs are involved in that process* [...] *then we'll begin to communicate to the teachers and prepare their minds that, oh, we*

> *are doing, they are going to be doing deployment, and the deployment prepare your minds for the fact that you might be deployed in your school or out of your school based on the needs that we have given them* [...] *even when we use the algorithm which may require teachers to move from their comfort zone, we will want to ensure that the proximity, or the time frame, yeah, between the final selection for deployment and the movement of those teachers should come round about the time where payments sit on because* [...] *there were teachers who were deployed through that algorithm and the list has been displayed and sent to us five months ago. To date, the teachers have not been paid, and yet you are expecting them to go to their deployed schools or their allocated schools. How will they go?* [...] *But if there is some sensitisation that has taken place* [...] *in terms of what are the factors you have considered, all of these things, sensitisation should be going along those lines* [...] *we will hammer home this point that* [...] *you will be deployed in any school, irrespective of whether it's your preferred school or not."* (District Director)

Some district directors recommended that **awareness of the new process should also be raised with the communities who are responsible for schools**—including school management committees, boards of governors, the Sierra Leone Teachers Union (SLTU), the Conference of Principals of Secondary Schools (CPSS), and local authorities—to mitigate backlash when teachers are assigned to schools where they are not currently teaching.

Some school leaders expressed frustration that they were not made aware of the new deployment process. After the teacher placements were released, one school leader mentioned that he lacked the contact information for the teachers assigned to his school, which prevented him from coordinating their placement. Another school leader said he was called and informed about the deployment, but requested that the TSC send written evidence as well.

> *"I would like TSC to inform school heads that we've sent these teachers to you. These are their numbers. This is their contact. You also contact them. But as I am sitting now, they said three teachers have been sent here. I don't know them. They don't have their number, and so how can I reach them?"* (School leader)

Teachers reported that they were informed about replacements, appointments, and the exam requirement and process. However, they were not informed about the algorithm and new deployment process until they were called to review the posted list with their school placements.

Teachers wanted to know the criteria for replacing teachers, as well as how and when they are to be replaced. They recommended that the TSC use multiple means of communication for teachers.

> *"I just want the people that are responsible to implement this policy to be able to communicate to us, the teachers. Because for anything, communication helps in a wide way."* (Teacher)

Section 3.1 has detailed participants' perceived impact of tech-enabled deployment on the government's decision-making process. Findings indicated that digitisation and technology had positive effects in terms of efficiency and cost-savings, but potential negative effects given the fact that the government has limited capacity to sustain and manage the algorithm. This maps onto the decision-making factors related to **user norms and resources/capacities** in ↑Custer et al.'s (2018) framework.

Another key finding showed that the tech-enabled deployment shifted teacher deployment to a more centralised approach, which changed the power dynamics in decision-making. Participants believe that these changes increased the transparency and accountability for the process, including making it more objective, and also helped combat political interference and special treatment that previously afflicted the decision-making process. In the conceptual framework, this finding clearly maps to the **user behaviours and roles, power and relationship** factors of decision-making.

Finally, we found that there was confusion around the extent to which sensitisation took place on the updated deployment process and use of the algorithm. At district and school levels, this created some backlash and limitations to the TSC's ability to justify deployment decisions to district directors, school leaders, and teachers. This finding most closely relates to the **user norms and behaviours** factor of decision-making.

3.2. Insights on tech-enabled deployment

This section presents insights on tech-enabled teacher deployment by summarising the key challenges participants identified with the 2024 deployment process (Section 3.2.1) and their assessment of whether it was able to support TSC policy goals and priorities (Section 3.2.2). Participant recommendations for future teacher deployment are captured in Section 4.

3.2.1. Challenges with the new deployment process

Several types of challenges to the 2024 deployment process were identified by participants, including those related to system constraints that required algorithm adaptations; questions around whether equitable allocation was achieved; how teacher preferences and school needs were met; and the persistence of previous deployment challenges.

System constraints

The algorithm aimed to distribute teachers according to TSC priorities more equitably. However, **the approach was challenged by several system constraints**. Firstly, not enough non-payroll teachers initially passed the licensing exam to allow for a full recruitment of the 2,000 teachers the TSC was aiming to deploy. This meant that several rounds of exams had to be held, delaying the deployment process. As not enough teachers from each district were passing the exam, this meant that specific **algorithm parameters had to be adjusted, including the one for sending teachers across districts**.

> *"[A]gain, there is the challenge of getting the number required by the district as well. So it's not totally the system because it's kind of, for example,* [district name]*, we needed over 100 teachers, over 100 teachers. We were not able to get up to 40 qualified from that particular district. So we had to import from other districts, close nearby districts. And so we are kind of, would I say, starving those districts as well. So, for example, the school I'm talking about with two teachers was hoping to get four, at least, and now the two have also been taken out. So, it's a kind of thing I don't know whether we need to improve our own system in terms of doing more exams and get more people qualified at district level. But again, I think the deployment should focus at district level."* (TSC HQ Official)

A major concern among participants at all levels was whether the teachers would accept their assigned posts and then remain in their new assigned schools, particularly in rural locations or areas that are far from the current schools where they are teaching. Currently there are no incentives or support from the government for teachers relocating to schools far from their current residence, or moving to rural and hard-to-reach locations.

As previously discussed, one of the most significant issues during deployment was **inconsistent communication about the new process**.

Teachers and school leaders emphasised the lack of communication around the assignments and clarity about how deployment decisions were made. Teachers reported not being properly informed about their placements, with some only learning about their assigned schools through colleagues or informal messages, leading to confusion and frustration. This confusion led to delays and potential rejections of new posts, as teachers were unexpectedly relocated to schools they had not applied for, often far from their current location, without prior notification or understanding that this was a possibility. One teacher even reported that they were splitting their time between their newly assigned school and their previous school, as the process for resolving their questions and concerns about their new assignment was unclear.

> *"I never knew about it. They never communicated to me. But my friends, they got the message. Maybe they called me, but my phone might be off because at that time, I was in the province. So my friends sent a voice message to me on WhatsApp. So I returned and I went at the TSC office. So I found my name from* [teacher's school]*, that was my school, to* [a different school]*. And I came to the principal and I explained the same story. I said, now I have seen myself here. So they have transferred me to this other place. So what should I do? He said, okay, we have time to go to TSC. But the principal will not go to TSC at that time. So I myself decided to go to TSC and ask. So that was the answer they gave me. Since governments have sent me to the preferred school, so go to the preferred school. But they told me that they are not only going to tell me again to leave my school, but the government said I should go to my preferred school. So I was alternating them, going to the preferred school three days and come here two days."* (Teacher)

Equitable allocation

In addition to the lack of communication, **the issue of equitable allocation was raised**. Several instances were reported by teachers, school leaders, and district directors in which teachers were moved from schools with a critical shortage of teachers to schools that were already well-staffed, exacerbating disparities.

> *"[I]n some instances what happen—the schools where the teachers were moved to again created overpopulation of staff in those schools, in those particular schools. There were teachers already in those schools, so the new teachers that will be transferred to those schools will make it become overpopulated again. So that was why I said if we were to validate the final list we sent to the district directors, please look at this list and see whether*

> *they are fit for purpose. For example,* [a teacher] *was teaching at, this is an example of a boarding school* [...] *now move to* [another school] *see whether it is correct or fit for purpose that would have been better somehow. That is what I was saying about a validation process because you can validate it, but it just came like that and now when you go to some schools you will find out that some schools where teachers were moved, there is only one payroll teacher and now this payroll teacher is moved* [...] *so this is the challenge."* (District Director)

Additionally, faith-based schools expressed concern over the reassignment of teachers from Christian to Islamic schools and vice versa.

> *"But what came out more interesting, a reverend sister teaching in a Catholic school being deployed in a Muslim school. These faith schools, it's very difficult to have a reverend sister to go and teach in a Muslim school, even though the deployment tool required the teacher to move. But you have other parameters that are not considered in developing the tool, like faith. In our country, or in many African countries, you still have religion as a base for education. Yes. So those parameters were not considered."* (TSC HQ Official)

Teacher preferences and school needs

The issue of how teacher preference and school needs were taken into account came up multiple times. Some TSC HQ and district officials noted that although teachers were asked for their school preference during registration, the algorithm was often unable to meet those requests, given the parameters and system constraints. Respondents noted that this creates serious backlash for schools that have invested in teachers, supporting them to get qualifications or paying their salary when they were volunteer teachers.

> *"So many cases* [...] *they want their school where they have been staying for some time. It's their school where they want to be recruited. So when you come now* [...] *and look at the deployments which we have done, you have a huge gap of the school where the teacher applied for and the school sent. Because the school you apply for may have oversubscribed or may even not been approved, even though the school might be a government-assisted but have not benefited from any recruitment. So you have a huge gap in between where the teacher wants to teach and where the teacher has been sent based on the teacher-pupil ratio. So, you find out that at the end of the day, some school came back saying*

> *that we have spent huge money on this teacher. The teacher was with us. We sponsored this teacher to go to a college for tertiary education and come back to serve us. All of a sudden, when the teacher applied for recruitment, the teacher is not approved under our school. Instead, the teacher is approved in another school. Sometimes even far off distance. So those issues are coming up."* (TSC HQ Official)

Teachers who were placed in schools where they had previously volunteered expressed satisfaction with the process. Of the 2,341 teachers deployed, 54% were assigned to their preferred school. They appreciated the opportunity to transition from volunteer to government-employed status, securing financial stability. One teacher expressed that,

> "*Well, I'm happy because I've been teaching here voluntarily for a very long time. So for me to be here again under the government, you know, I am happy.*"

However, dissatisfaction remained high among those who felt unprepared for relocation or were placed in schools without their input.

Additionally, the algorithm was supposed to allocate teachers within 3 km of their existing location or the school where they were teaching. However, **participants at all levels reported that teachers had been sent across districts and over long distances from their current locations**.

> *"I will go back to say I was surprised at some point where I realised that teachers are moving across districts. I wasn't expecting it to be that. I was thinking in the initial discussions and all of that, I was thinking we'd be able to get those numbers in each district. And then moving somebody within the same district is easier than moving them outside of the district. So I think that's the only shock."* (TSC HQ Official)

Teachers and school leaders expressed concerns about being assigned to schools far from their homes, which they indicated can create financial and personal burdens. Teachers reported that they often have families they are responsible for in their current locations, which can create tension around relocating. Many had built relationships with students and communities, only to be reassigned to unfamiliar environments and without adequate preparation. **Respondents also noted that teachers having to cover expenses related to transportation, housing, and cost-of-living differences poses a challenge to teachers moving to and staying in newly assigned schools.** Some participants noted that support mechanisms should be put in place (such as allowances for remote

locations, accommodation, etc.) if asking teachers to relocate. Without additional support, teachers might not accept new posts or could seek transfers back to more familiar or financially viable locations, leading to high turnover, especially in remote schools. In fact, some school leaders noted that some teachers remained in their original schools despite being reassigned.

> *"Even if they are sending someone to a particular place, there must be facilities. Because if you are taken from your home to another place, then there must be a facility* [...] *You cannot just move me from one place to another without anything. And some of us have families. We have children. We have brothers and sisters that we do cater for. So if they are asking us to move, then we are pleading with them to be creating facilities for us* [...] *facilities like transportation, facilities like housing, that one is more relevant to help the policy."* (Teacher)

> *"First, to reach to my aid when it comes to the transportation aspect. Okay. Yeah, because it is really challenging, you know, so I'm appealing to the government to be providing incentives or extra incentives apart from the salary for people who have been deployed into rural communities or areas which are beyond their reach so that will ease up the aspects of transportations, and it will also enable them to have passion or love for the teaching field area. Because if I can tell you, one of the reasons why teachers are out of the teaching field is because there are no extra incentives apart from the salary. That is why people just say, ah, you know, there is no better facility, let me go and find another means of earning money rather than teaching."* (Teacher)

Finally, school leaders **expressed concern about 'displaced' long-serving volunteer teachers who were being replaced by qualified teachers**. They felt pressure to compensate these teachers and ensure the government recognised their service. One school leader said that there was no guidance on how to adequately compensate these teachers for their years of service or support them to become qualified.

> *"And those people* [unqualified, volunteer teachers] *who have been with me here, if now the government sends qualified teachers, how am I going to take this? Should I just ask them to leave the school because somebody is already here with people and is teaching your subject? And so they will sit back and say, you have been ungrateful to us, we have been with you here, you* [...] *now it's because you have now got new teachers, you forget about us. That is what they will tell me, they have always been pointing fingers at me that I am not talking for them* [...] *TSC doesn't know them* [...]

> *What do I do with these teachers? What should I console them with? They have no NASSIT. It's like all the teachers, the previous years they've taught. There is no compensation. There is no payoff at the end of the day. You, the school head, will get stressed. Now, I have been teaching in your school for eight years as a volunteer. How do you leave me now? Now, the government doesn't know about me. How do you want to leave me? You understand?"* (School leader)

Persistence of previous deployment challenges

Systemic issues, experienced in previous deployments, persisted in the current deployment process. This included delays to newly recruited teachers being put on the payroll. Given delays created by the exams, final recruitment lists were not provided to the Ministry of Finance at the right time, and some teachers interviewed had been waiting months to receive their first pay, making it nearly impossible for them to relocate or sustain themselves in their new positions. One teacher reported waiting for months after completing all the required steps, leading to financial hardship and uncertainty about their employment status. District officials also emphasised how they had no leverage to ask teachers to move, since they had not yet been put on the payroll. Some of these issues stem from discrepancies in teachers' personal data, such as their banking or social security numbers, errors which had to be corrected manually by the TSC.

> *"[I]t's budget implication, when there's budget for it* [putting teachers on payroll] *and when the donors are ready to support the government, and that's the time they approve them. Yeah. But those teachers, if they know when they are applying, they ask for recommendations from the school. So if you apply, then you apply through a particular school, you are encouraged to start teaching. But sometimes it will take them three months, two months, four months, yeah, before they start getting their salaries."* (District Director)

> *"You cannot enforce discipline on somebody who is not paid, is not yet your staff. The person only becomes your staff when they are paid salaries, so we are waiting for that. So the end of this month, we may now do some random selection in both those schools in the locations, just to confirm whether those teachers are deployed, so where they have not gone, we may now know what to do."* (TSC HQ Official)

3.2.2. Impact of the new deployment process on meeting policy goals

Participants were asked about the effectiveness of the new deployment process in meeting TSC priorities and policy goals, including gender equity, reaching remote areas and those schools with the greatest needs based on PQTRs. However, **participants at all levels reported that the effectiveness of the algorithm remains uncertain,** noting that at the time of data collection, it was too early to evaluate the actual impact. Not all teachers had been notified of their placement, and others had not accepted or taken up their new posts or even started receiving their salaries. For findings on how the new deployment process impacted TSC priorities and policy goals, please see ↑Koutecký et al. (2025).

As noted in Section 3.1.1, the TSC identified benefits related to the efficiency of the decision-making process itself, such as cost savings and reduced political interference. However, **most participants were reluctant to assess the actual impact of the deployment on the equity of teacher allocation**.

> *"We want to see the outcome. And the outcome cannot be determined now. It has to take some time to see what's going on. But for reducing the human factor, clear. And that has helped us. You know, saving time for us, clear. Saving money for us as well, it's clear. That has been met. But the outcome, what do we want to see? We want to ensure that those teachers are in those schools. We've deployed them. That's where we want to see. And that's the outcome we want to see at the end. But that cannot be determined now until we see how that goes."* (TSC HQ Official)

> *"Nothing has started because the deployment itself practically has not started. As I said, the teachers which this deployment targeted, they have not started receiving salaries. They are not even aware they are supposed to go to new schools. They are not aware. So they are still in their original schools."* (District Directors)

One TSC HQ staff member did say that **the algorithm had theoretically supported TSC policy goals,** noting that:

> *"[T]he benefit here is that you know there are districts now that otherwise wouldn't have [...] received as many teachers as they have now [...] the biggest benefit is we are giving teachers where they are needed, we are giving more teachers where they are needed, and I think that is the greatest benefit."*

However, **it was unclear from school leaders' and district directors' responses whether the algorithm could meet district and school needs**.

Several district directors highlighted **the positive impact of the algorithm within their district, noting that schools previously without qualified or payroll teachers were now receiving teachers**, to the delight of their school leaders and the communities. This was also echoed by several school leaders, who mentioned that they were now receiving teachers on the payroll where they historically did not have any.

> *"Yes, the feedback, some of the school leaders, they came to the office and said, I think this system is working. We are now having them in our schools. They are regular and beautiful. So the system is working. We are not having any problem this time around."* (District Director)

Several district directors mentioned that **more female teachers had been placed in rural communities**, which was a key policy objective.

> *"[S]ome of the schools* [...] *especially the rural communities, they were not having a female teacher, but for now, the system is the one directing. They go there because the teacher wants to be employed. So they go there. So all of this one, it helped them in terms of gender."* (District Director)

However, many district directors and school leaders also noted that while the algorithm was helping to place teachers in schools previously without payroll teachers or with large teacher-pupil ratios, **they were still missing subject-specialist teachers, or in some instances, subject-specialist teachers were the ones who were transferred elsewhere, leaving a school previously with an adequate number of staff now without a specialist teacher.**

> *"As it stands, it has not met the needs of my district because there is a loud cry from even the teachers that have been deployed, yeah, there is a loud cry from their various schools from which they are coming from, to say, Oh, this is the only science teacher, for example, that I have. This is the only chemistry teacher that I have in my school. Now that you have recruited him, you have moved him from my school to another school or to another location, then you have killed that subject in my school. And so there is that hue and cry across the district. So there are challenges around."* (District Director)

A major concern among all participants was, first, **whether the teachers would accept their assignments** and, second, **whether they would**

remain in their new schools, particularly in rural or distant areas or areas that are far from the schools they are currently teaching in.

> *"[...] when they finally get their salaries, and when we expect them to be in those communities, that's when we will confirm whether in fact they've accepted, because we know they will protest. Some will come back or some will not go, or taking the salaries and not go. So those we will have to take action against because this is why we want to have a bank of teachers who are potential candidates that can stand into place. So we want to encourage more teachers to take the exam, and this is why we are going to those communities. So if a teacher does not go or refuses to deploy we will take another teacher that will go and take that place. So we want more teachers in our database."* (TSC HQ Official)

4. Recommendations

This study aimed to understand how Sierra Leone's latest iteration of teacher deployment (2024), driven by a matching algorithm, affects the government decision-making process on allocation. The findings discussed above illustrate improvements as well as new and persistent challenges with tech-enabled teacher deployment. This section presents a summary of recommendations drawn directly from the responses of study participants and analysis of the data.

4.1. Enhancing communication

One of the key findings from this study indicated that inconsistent communication about the deployment process and algorithm created confusion among different education stakeholders. It limited the government's ability to justify decisions at local levels and potentially created delays in teachers accepting their new posts. To help address this issue, it is recommended that the government:

- Continues to work with Parliament and the highest levels of government to communicate changes to teacher deployment and rationale.
- Ensures all district directors have a clear and comprehensive understanding of the new teacher deployment process, including any changes to their roles, as well as at least a basic understanding of how the algorithm functions. District directors should be given the chance to explain the process themselves with TSC HQ before having to communicate with school leaders and teachers.
- Supports district directors to communicate teacher deployment changes to schools within their districts well ahead of the next deployment round.
- Thoroughly explains to teachers the criteria for replacement and allocation.
- Undertakes widespread and general public sensitisation about updates to the teacher deployment process and the rationale, including with community leaders, School Management Committees (SMCs), Boards of Governors (BoGs), and Community Teacher Associations (CTAs). Multiple forms of communication methods and approaches should be used (e.g., TV and radio) to ensure as many stakeholders as possible are reached.

4.2. Improving planning

Planning for teacher deployment starts by ensuring there are enough eligible teachers to deploy in each district and for each school level. This includes teacher registration on the TMIS and taking and passing the licensing exam. To help address potential challenges, it is recommended that:

- The TSC plans for the next teacher deployment in advance and creates an indicative list that specifies the number of teachers that need to be deployed, disaggregated by district and school level.
- The TSC communicates the list to districts and works with district directors to ensure a sufficient number of licensing exam candidates (and those who pass the exam) ahead of the teacher deployment.
- The licensing exam is popularised in districts, and it is advertised well in advance of the exam dates to allow for sufficient time to register.
- If harder-to-reach locations receive fewer registrations, TSC may consider strengthening advertising for these areas, even in other districts, noting that the positions in those districts are more likely to be obtained.

4.3. Clarifying roles and responsibilities

Findings show that some district directors and school leaders were confused by their new role in the teacher deployment process. They emphasised that they have an important role to play in deployment as they have intimate knowledge of local school realities that might not be aligned with current data. Participants suggested that:

- District directors are included at every stage of the deployment process, especially in checking the data gathered by the government. This would include checking the algorithm output against the knowledge the directors have about their districts and schools before final deployment decisions are made.
- School leaders are made aware of teachers being deployed to their schools and have the ability to signal that they accept the teachers. School leaders also requested that they receive information about the teachers newly assigned to their schools, so they can contact the teachers themselves.

4.4. Ensuring initial training, ongoing capacity building, and resourcing

Ensuring the government provides the training and capacity building required to manage the new recruitment process and algorithm is critical to the success of future tech-enabled teacher deployment. This includes making sure every stakeholder has the requisite capacity and resources to manage and sustain their part of the process. Recommendations to address this include:

- The TSC working with donors and the Ministry of Finance to integrate costs related to hosting and running the algorithm into their budgets.
- Providing all TSC HQ staff with general training on the entire deployment process, including a high-level explanation of how the algorithm functions, what criteria it takes into account and why, as well as the steps of the entire process and the roles of TSC staff at each stage.
- Providing TSC staff from across key departments with detailed training on how to run, manage, and maintain the algorithm. Technical staff should be trained on how to adapt and troubleshoot the algorithm when changes are required. Participants suggested that this training is best undertaken in person and not virtually.
- Providing training for TSC District Directors to familiarise them with how the algorithm works, so they know precisely what is happening beyond a conceptual understanding of why the algorithm is being used and the criteria it uses.

4.5. Adapting the teacher licensing exams

Teachers struggled with taking the licensing exam digitally, and several rounds of the exam had to be held unexpectedly. Recommendations to help address this issue include:

- The TSC continues to share, via WhatsApp, the three-minute video titled ‘How to use the TSC Teacher Licensing Exam App in seven simple steps’ with teachers registered to take the exam.
- The TSC district offices provide introductions and training on the licensing platform for teachers registered to take the exam.

- The TSC gives teachers the opportunity to take practice exams on the testing platform.

4.6. Adapting the algorithm

Based on the issues raised by participants across all levels, several improvements to the algorithm are suggested:

- As previously noted, district directors should be given the opportunity to add their input prior to the deployment process (potentially through a survey) and the chance to check algorithm outputs against their knowledge of their district and schools.
- Continue to prioritise a three-kilometer radius to ensure teachers are not asked to move long distances and are deployed within their districts before being sent to other locations. When this is not possible, incentives and allowances should be considered to help teachers manage the financial burden of moving.
- To match teachers to schools of the same faith as the school they are teaching in, the algorithm uses school names. However, some teachers were sent to faith-based schools that were different from their faiths, so another approach needs to be considered to better match this preference, perhaps by collecting this information through the ASC.
- The TSC might consider taking into account teacher disability status, as several participants mentioned that it was generally a TSC priority. This would require the government to systematically collect this data on teachers. Questions on disability could be added to the TMIS registration form.

4.7. Improving teacher uptake of new posts

Participants at all levels expressed concerns that teachers might not take up their newly assigned posts or remain at those schools, particularly in remote and hard-to-reach areas. They recommended the following to improve teacher uptake and retention.

- The government should provide incentives, such as relocation allowances and accommodation, to ensure that teachers are supported when asked to move. Participants pointed to other government sectors, such as health and law enforcement, where employees receive incentives for working in remote areas.

- As discussed above, district directors and school leaders emphasised that communicating with teachers to clarify expectations on potential school placement, before the recruitment and deployment process starts, could help teachers be more accepting of new posts.
- Related to the above recommendation, TSC may consider sharing a list of prioritised schools for deployment ahead of the recruitment, so that teachers can apply for deployment to schools where they are more likely to get deployed.
- Finally, the TSC should ensure that teachers are added to the payroll, receive their salaries, and verify that they are teaching at their assigned schools (where applicable).

4.8. Providing guidance on unqualified teachers

For long-term volunteer teachers who are not qualified for recruitment, school leaders requested guidance on how to transition these educators to formal positions or how to provide adequate compensation for their years of service, especially when they are replaced by qualified teachers.

5. Conclusion

Research shows that even where there are enough teachers, inequitable distribution can create challenges to providing quality learning for all. There is little evidence on how to promote equitable teacher deployment, especially in low- and middle-income countries. There is research to suggest that technology can support more equitable and efficient teacher allocation, and some education systems have started to adopt online centralised systems that use technology to improve allocation. This study aimed to understand how a tech-enabled, centralised teacher deployment process, driven by a matching algorithm, affects the government's decision-making process on allocation in Sierra Leone.

We examined the intersections of various deployment elements, including new recruitment requirements, the introduction of digitised data and systems, the matching algorithm, and policy goals and criteria. The influence of these factors was explored against key features of decision-making—norms, behaviours and roles, power and relationships and resources and capacities. Based on the government's previous challenges with deployment, we looked closely at certain aspects of these features, including changes to the efficiency of the decision-making process and whether the algorithm influences the government's ability to communicate and justify deployment decisions in any way.

Key findings related to participants' perceived impact on the decision-making process for deployment show that there are specific implications of digitisation and technology use in the deployment process around efficiency, cost saving, and system capacity to manage new technological requirements. The shift to a more centralised, tech-enabled deployment has altered the power dynamics in decision-making, causing confusion among district staff. This shift also affects previous accountability structures, with participants reporting increased transparency and being able to combat political interference. Finally, inconsistent and limited communication about the new process and how the algorithm works has created some confusion and backlash at school and district levels and limited the TSC's ability to justify deployment decisions.

Insights from the tech-enabled deployment highlight several challenges, including system constraints, such as an insufficient number of teachers initially passing the licensing exam. Understanding the algorithm's impact on equitable allocation was difficult, as there were mixed responses on whether the deployment decisions responded to school and district needs. Participants reported that teachers were often required to relocate far

from their current schools without receiving support or incentives, and many were not yet included on the payroll. This created potential issues with teachers accepting their new posts.

Participants at all levels reported that the algorithm's effectiveness remains uncertain, noting that it was too early to evaluate the actual impact, as not all teachers had been notified of their placement. Others had not accepted or taken up their new posts, or even started receiving their salaries. However, there was a sense that theoretically the algorithm had helped the TSC meet its policy goals, in terms of transparency, considering teacher preferences, and prioritising schools most in need.

While it is to be expected that the government's transition to new tech-based systems will face various challenges (e.g., system constraints, logistical issues, limited government capacity), this study has illustrated the importance of key elements of the decision-making process in facilitating tech-enabled teacher deployment. Most significantly, the need for widespread and clear communication on why technology is being used and how it functions, as well as clarity on changes to staff roles and accountability structures, is key to the successful integration of tech-enabled tools in teacher deployment.

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Annex: Changes to the teacher deployment criteria

Initial teacher deployment criteria and algorithm settings

The table below shows the initial teacher deployment algorithm settings and their changes across the 2024/25 deployment process.

April 24	Sep 24	Nov 24	Dec 24
2,000 teachers	**2,000 teachers**	**2,000 teachers**	**2,341 teachers**
Rule – District level quota: The teacher quota would be distributed to individual districts as guided by the PPTR across districts in an effort to smooth out inequalities between districts.	**Rule – District level quota**: Based on PPTR across districts and learning outcomes (to meet GPE funding criteria).		
Rule – School level quota: Teacher quota would be distributed as follows: pre-primary (5%), primary (60%), JSS (20%), SSS (15%).	**Rule – School level quota**: Teacher quota updated to correspond to school levels of teachers who passed the licensing exam as follows: pre-primary (2.09%), primary (45.15%), JSS (38.49%), SSS (14.27%).		
Rule – Prioritised schools: Schools within districts at each school level are prioritised in terms of need, based on the PPTR (for a given			

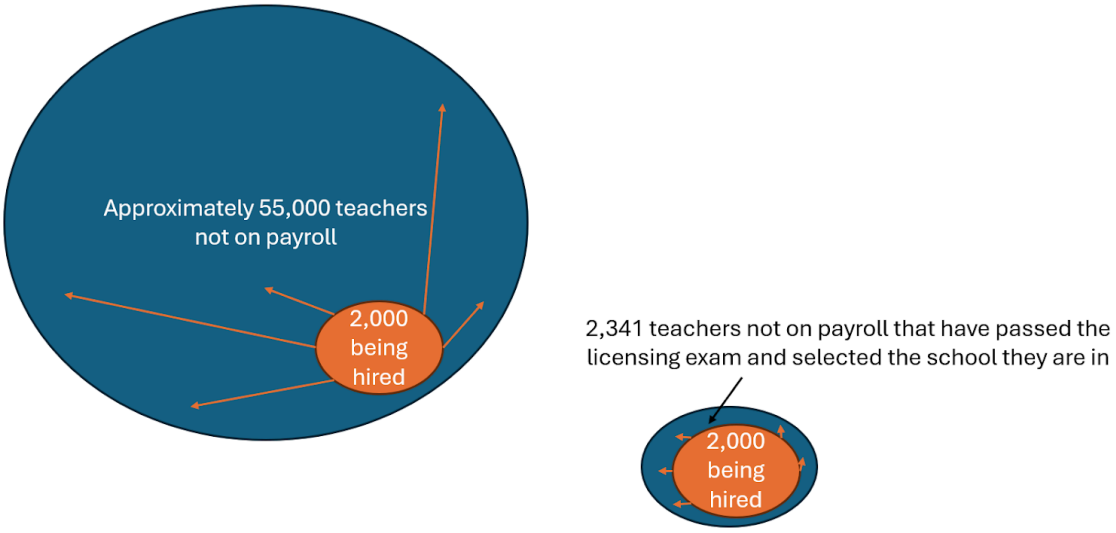
education level). The schools with the highest need, get teachers first.			
Rule – Teachers are licensed: Only teachers who passed the Teacher Licensing Exam would be eligible for deployment on the government payroll.			
Rule – Eligible schools: Only non-private schools with a minimum of three years of financial support (L2 approved).	Three-year requirement dropped, only financially supported schools (L2 approved as of 2024).		
Rule – Distance from preferred school: constraint of maximum 3 km from current school	Maximum of 5 km from preferred school		Maximum of 42 km from preferred school
Rule – Deployment by school level: Teachers only assigned to the same school level			
Rule – Unqualified teachers: Unqualified teachers will not be recruited			
		Rule – School religion: Religion match between preferred	

		and allocated school	
Preference – Remote Schools: More remote schools prioritised	Dropped (to maximise possibility of teachers remaining in their school of preference)		
Preference – Gender: Female teachers are prioritised	**Tie-break: Female teachers prioritised**: Dropped from preferences, added as tie-break (to maximise chance teachers remain in their school of preference)		
	Preference – Teacher: Teacher's preferred school is prioritised		
Tie-break – Teacher Qualification: Priority based on qualification level (TC < HTC Primary < HTC Secondary < Bachelor in Ed. < PG Diploma < Masters/PhD)			
Tie-break – Teacher Experience: Teachers with longer service prioritised	Dropped (data not available in TMIS)		

How and why did the criteria initially set for teacher deployment change?

The main shift in the narrative came when the teacher input data with information on licensed teachers who had passed the licensing exam was shared. This meant that the selection of 'best suitable' teachers was greatly reduced to selection from a pool of teachers who had passed the licensing exam.

This meant that instead of selecting from a pool of approximately 55,000 non-payroll teachers in the country, the selection was made from 2,341 available teachers who had passed the exam. The implication of this reduction in the number of available teachers meant a **shift away from selecting 'which teacher',** as 85% would be selected, to mainly focusing on **'which school'** as illustrated in the figure below.



This reduction in the number of available teachers also meant that certain **rules needed relaxing** to enable the deployment of all 2,000 teachers while ensuring teachers were not deployed too far away from the schools they were already teaching in, and simultaneously, that a particular school did not receive a high number of new payroll teachers while other schools did not receive any. A balance between these two variables was found by setting the maximum distance to 5 km and capping the maximum number of teachers who could be deployed to one school at three teachers.

Moreover, when the input data about teachers who had passed the licensing exam exported from the Teacher Management Information System (TMIS) was shared, it was discovered that the '**number of service years**' **variable was not available** in the dataset, and the **teacher data could not be paired with the Annual School Census (ASC) dataset due to the unavailability of unique identifiers** between the two datasets.[6] Therefore, the 'tie-break' concerning length of service had to be dropped.

[6] The Ministry of Basic and Senior Secondary Education (MBSSE), which oversees the ASC data collection, uses updated EMIS codes as unique school identifiers, while the Ministry of Finance, which hosts the teacher payroll, still uses the outdated School Identification Number (SID) codes.

More importantly, **information on the teachers' current schools was unavailable** in the TMIS data, so information on **teachers' preferred schools was utilised instead** to determine distance from the destination school. This allowed teachers to select any eligible school in the country, as the algorithm would then try to place the teachers at that or the nearest available school in proximity to the preferred school, which may not necessarily be the school that the teachers were currently teaching in. This may be advantageous to teachers who may not have been teaching at their desired locations. However, it requires ensuring that the preferred school is selected as desired.[7]

The above-mentioned 'rule relaxation' meant that due to the reduction in the number of available teachers caused by the relatively small pool of teachers who had passed the licensing exam, an **additional feature** was **developed** in the teacher deployment algorithm which allowed for running the deployment in 'batches'—an **ability to run several teacher deployment rounds subsequently**, allowing for seamless updates of the input files and the remaining pool of teachers to deploy, and allowing for updating the matching criteria.

In fact, many other additional features were developed throughout the process to consider specific requirements of this flexible deployment algorithm to perform as desired in Sierra Leone. These included the development of an **offline version of the tool** to ensure it can be used on the local intermittent internet connection, a '**shortest distance' preference**—which allows for setting a higher total distance buffer but aims to minimise the distance between the school of preference and the placement school, and functionality for **manually setting a PPTR target for each school level**, instead of targeting the default national average, which allowed for deployment of more teachers to schools which may not have been assigned any teachers if the schools were above the national average. All these developments proved essential to efforts to make the final suggested teacher deployment in 2024 as good as possible.

The preference setting for '**more remote schools being prioritised'** defined as 'distance from the district HQ', was also **dropped** as it was causing **unnecessary movement of teachers from their preferred schools** to more remote schools. This preference setting was dropped to maximise teacher satisfaction with their allocation to their preferred schools whenever possible. This change significantly improved the likelihood of teachers being placed in the schools they desired. Similarly,

[7] Note that selecting an incorrect preferred school by mistake would lead to trying to allocate the teacher to that or a neighbouring school.

the requirement for schools to be **L2 approved** (i.e., eligible for financial subsidy) **for a minimum of three years** was **relaxed** to needing to be **approved in 2024**. This was again agreed with the TSC to maximise the number of teachers who can be placed in their preferred schools.

Another significant modification to the between-district allocation was introduced when the GPE financial compact was shared. Then, it was discovered that the **distribution of newly qualified teachers to districts** should be **guided by learning outcomes**, and not the PPTR alone. Following this, a meeting between the TSC and the MBSSE Minister led to the agreement to consider seven learning outcomes, consisting of both national—National Primary School Examination (NPSE), Basic Education Certificate Examination (BECE), and West African Senior School Certificate Examination (WASSCE)—and sample-based assessments—Sierra Leone Education Innovation Challenge (SLEIC) and the Secondary Grade Learning Assessment (SGLA)—to minimise high variance in these scores for a particular assessment between years.[8] These seven learning assessment scores accounted for 25% of the total weight, whilst PPTR guided the remaining 75% of district allocation. This **specific targeted distribution of teachers to individual districts** rule was used to guide the **initial run of the deployment algorithm** but was then dropped for the subsequent runs as shown below.

This is due to the fact that this district allocation was not achievable without significant relocation of the teaching workforce from districts with a surplus of teachers who had passed the licensing exam to districts with a shortage of the required number of teachers for deployment. While this was the TSC's original intention, there was pushback from teachers and the teachers' union representing them. There were also challenges in communication and dissemination when teachers were allocated to schools that were not the preferred schools they had selected when registering for the licensing exam.

The TSC then participated in a press conference which was broadcast via national mainstream media to sensitise the public about how teachers were being deployed and to explain the benefits. However, this did not have the desired outcome, and **priority was given to the location of the preferred school** to minimise teacher movement whenever possible. Note that if the schools teachers selected as their preferred school were schools with an over-supply of teachers beyond a set threshold and to ensure an equitable distribution within districts, teachers would then be placed at

[8] The latest available assessment data was used. SGLA and SLEIC considered separate English and Maths learning outcomes.

the nearest available school and not necessarily the exact school they had selected. Notably, the TSC also set a requirement that no school would receive more than three new payroll teachers to avoid a situation where some schools received a high number of teachers, while others received none. This approach was followed to satisfy the teacher preferences as much as possible, and to ensure the financial conditions imposed by the GPE trigger were met. According to the condition, the "Proportion of newly qualified teachers allocated to targeted districts (disadvantaged districts) compared with proportion of newly qualified teachers allocated to non-targeted districts" must be met. Given that 10 of the 16 districts were defined as 'disadvantaged' (meaning their learning outcomes were below the country average) this condition was still met.

Below is a summary of the process followed to deploy the 2,000 teachers:

- **Follow the criteria as set above** → 1,534 teachers were matched, exhausting the supply.
- **Drop the district-level rule** → a total of 1,954 teachers were matched. This was necessary as certain districts did not have a sufficient number of licensed teachers, and the only other option would have been to force teachers to travel longer distances from districts with a licensed-teacher surplus or ask teachers to move. Both options were rejected, so the only option was to deploy teachers to schools in need near their preferred school.
- **Expand the radius of maximum distance from preferred school to 10 km** → 1,969 teachers were matched. This was necessary as the neighbouring schools from preferred schools within 5 km maxed out their teacher quotas.
- **Drop school type constraint** → 2,000 teachers were matched. It was essential, as the supply of teachers in lower school levels within 10 km of preferred schools (maximum distance agreed with TSC at this point) was exhausted, so the only way was to deploy more teachers to secondary schools.

Later, the TSC decided to deploy the remaining 341 teachers on the government payroll who had not been selected in the first deployment of 2,000 teachers, which had been cut through the redeployment funding stream. This meant that a separate deployment exercise was conducted at a later stage, allocating the remaining eligible workforce to suitable schools in need.

Since neighbouring schools were largely exhausted for this set of teachers (as they had not been initially set for deployment), further modifications had to be made, balancing distance from preferred schools and the maximum number of teachers assigned to schools. In the end, the most viable scenario agreed was to increase the possible number of teachers to be deployed to a particular school to six teachers and increase the distance from the preferred school to 42 km. This way, all 2,341 teachers who had passed the licensing exams were suggested for deployment to a suitable school.