

BUILDING AN OPTIMAL EDUCATION WORKFORCE

KEY ELEMENTS FOR EFFICIENT
HUMAN RESOURCE MANAGEMENT



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Abstract

Ensuring efficient distribution of educational personnel is key to improving the quality and equity of the education system. This technical note presents a conceptual framework for implementing an Optimal Functional Staffing plan—a process that enables estimation and management of the appropriate number of educational personnel in each school, avoiding both shortages and surpluses in allocation. Additionally, it discusses the necessary conditions for implementation, emphasizing the importance of having an institutionalized process supported by reliable data and a trained technical team. The processes addressed in this note are fundamental for designing a human resources management and monitoring system that optimizes the analysis of educational personnel demand and supply.

Introduction

One of the key processes in school management is ensuring that, in each academic year, all educational institutions have the appropriate number of qualified personnel on their teams, including teachers, tutors, coordinators, and principals, among others. To achieve this, it is necessary to analyze how many professionals are required and how many are available (i.e., the gap between demand and supply); analyze whether, given these gaps, existing personnel can be reassigned within and between educational institutions to ensure all students have adequate staffing; and, if these reassignments are insufficient to close the gap, consider hiring new personnel. In this technical note, we present a conceptual framework to ensure this management process guarantees that the education system has the appropriate number of personnel in each educational institution, grade, and section, avoiding both personnel shortages and surpluses.

Correctly estimating the number of personnel needed is fundamental for ensuring educational **quality**. Evidence shows that teachers significantly impact school outcomes, both in the short term regarding student learning (Rivkin et al., 2005; Kane and Staiger, 2008; Araujo et al., 2016), and in the long term on indicators such as college attendance, future earnings, and reduction of teenage pregnancy (Chetty et al., 2014). Additionally, it has been shown that other school personnel, such as principals, counselors, and tutors, also influence student performance (Lockwood et al., 2010; Grissom et al., 2015). Assigning qualified personnel to educational institutions in the necessary quantity for their operation is essential for improving educational service quality and learning outcomes.

Identifying educational personnel gaps also contributes to **equity**, given that the most vulnerable and remote educational institutions often face greater shortages of qualified professionals (Bertoni et al., 2020; Evans & Acosta, 2023; Ingersoll & Tran, 2023). This shortage is due to various factors, such as lack of resources in the most vulnerable regions for personnel hiring (Eurydice, 2018). Additionally, professionals tend to prefer more urban and privileged schools, which makes it difficult both to attract candidates in selection processes and to retain personnel once assigned to these schools (Lankford et al., 2002; Bertoni et al., 2023). A strong management system is fundamental for detecting and correcting these inequities, prioritizing personnel assignment in educational institutions that need it most.

Similarly, objectively and periodically estimating and addressing educational personnel gaps helps avoid **inefficiencies**, such as personnel surpluses in certain educational institutions. Salaries and benefits for teachers, administrators, and other professionals represent a significant portion of educational spending: on average, OECD countries allocate about 80% of their annual budget to educational personnel salaries, while in Latin America and the Caribbean it reaches 85% (OECD, 2019). Inadequate human resources management can lead to oversized or poorly allocated staffing that doesn't respond to real needs and generates additional budgetary burden. This is even more relevant in Latin America and the Caribbean, where countries face serious fiscal challenges due to low economic growth, estimated at 2.2% for 2024 and 2.4% for 2025 (ECLAC, 2024). Therefore, defining optimal staffing is crucial for ensuring educational financing sustainability.

For schools to have an appropriate number of qualified personnel, it is fundamental to implement objective management processes. In their absence, hiring and assignment of professionals can be influenced by interests that are not always aligned with improving educational quality or equitable distribution of human resources (Bertoni et al., 2020). For example, in the absence of clear rules, staffing definition may favor institutions with greater negotiating power, which are usually those in higher socioeconomic contexts. Additionally, when personnel allocation depends on discretionary decisions, political incentives or pressure from interest groups, such as unions, may arise to hire more personnel than necessary.

The educational personnel staffing management process is one of the fundamental components of any Educational Management and Information System (EMIS). This system encompasses various management processes for administering an education system, such as physical infrastructure and equipment, educational institutions, human resources and budget management, students and learning, and digital content for teacher training and learning (Arias et al., 2021). For educational personnel management to be effective and timely, it is essential that it be supported by a robust EMIS, with digitized, updated personnel data linked to other system elements, such as information about schools, classrooms, and student characteristics, including unique identifiers for each of these elements. Beyond technological support, effective management requires additional conditions, as we will see later, including process institutionalization that ensures sustainability through clear and transparent rules, and the formation of a specific team within the Ministry or Department of Education responsible for coordinating and managing processes related to defining and addressing personnel needs in educational institutions.

It should be noted that all education systems, in one way or another, make estimates about personnel needs and execute actions to address them. However, there are important differences in the degree of objectivity, precision, and systematicity with which these processes are carried out. This technical note seeks to clarify and systematize the definitions and key stages of this process to advance toward more rigorous management that contributes to reducing inefficiencies and inequities in personnel allocation.

Below, we will present the conceptual framework for Optimal Functional Staffing, analyzing the key conditions necessary to ensure an efficient, equitable, and sustainable management process.

Implementation Processes for Optimal Functional Staffing

The first step in this framework is **identifying** the personnel necessary to meet demand in the education system. In this stage, the amount of educational personnel and workload required is estimated, taking into account demand variables such as enrollment and curricula. Similarly, it analyzes how this workload can be covered with personnel already available in the system.

In this stage, the concept of a staffing or teaching post (hereafter referred to simply as “post”) is fundamental.¹ A post is the assignment of a role within an educational institution—that is, it defines where and how a staff member with a specific role or job title carries out their duties in the school. This post has particular characteristics, detailing elements such as the subject, educational institution, student section, and workload. Each post has specific dedication and schedule, in addition to responsibilities linked to teaching content and attention to a particular group of students. Similarly, each post has a unique identification that allows its traceability and can be filled or vacant depending on whether personnel has been assigned.

The concept of post may receive different names depending on the country. For example, in Brazil and Uruguay, the term “teaching hours” is used. These differences reflect not only terminological variations but also different regulatory approaches. For example, the duration of class hours associated with a post may vary between countries (in Bolivia it equals 45 minutes, while in Colombia it corresponds to 60 minutes). Similarly, group size criteria for posts (maximum and minimum enrollments they can cover) may differ by country, school types, or educational levels.

1. See this and other definitions in the glossary.

The following table illustrates examples of posts in schools A and B. Both institutions require five “English teacher” posts, each with a dedication of 90 minutes per week, to cover the needs of their respective sections. The identification of these posts must be based on objective criteria that reflect the real demand of the education system, such as maximum section size, number of teaching hours per subject, and subjects included in each grade.

Table 1. An Example of Posts

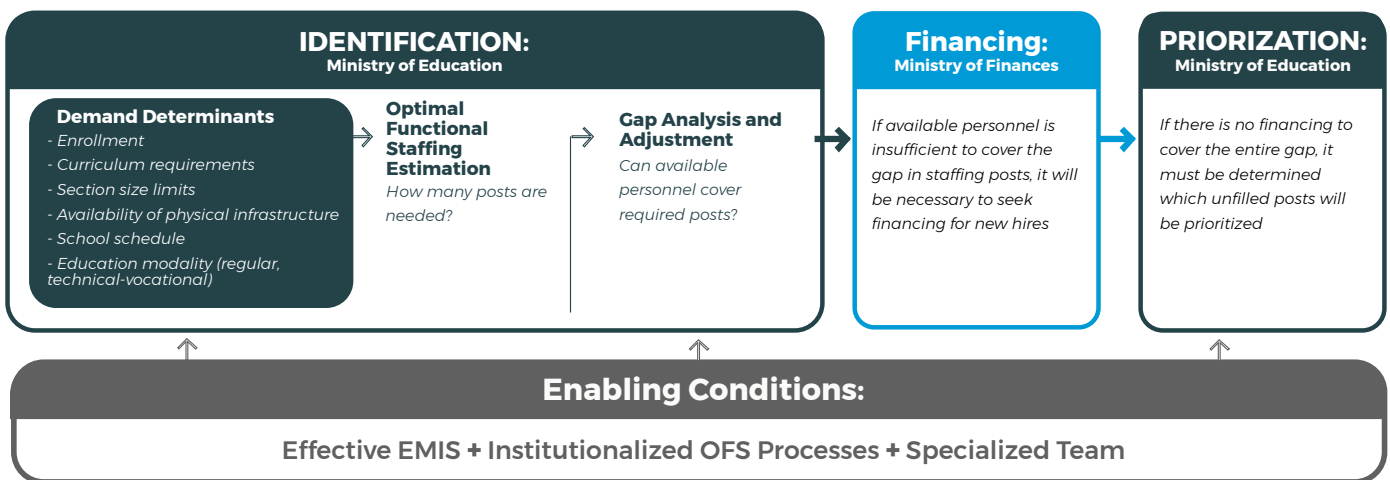
<i>Post ID</i>	<i>Educational Institution</i>	<i>Subject</i>	<i>Grade</i>	<i>Section</i>	<i>Section Size (enrollment)</i>	<i>Weekly Workload (minutes)</i>
1	A	English	5	A	23	90
2	A	English	6	A	24	90
3	A	English	7	A	22	90
4	A	English	8	A	20	90
5	A	English	9	A	25	90
6	B	English	5	A	19	90
7	B	English	5	B	22	90
8	B	English	6	A	24	90
9	B	English	6	B	22	90
10	B	English	7	A	25	90

Source: Authors' elaboration.

In this same identification stage, analysis of how to cover these posts with available educational personnel is also included. Like the definition of posts, the assignment process is also determined by the specific norms and policies of each system. These include assignment rules (for example, whether teachers can be transferred between schools) and provisions about workload (for example, when this is divided between teaching and non-teaching hours dedicated to preparation, evaluation, or pedagogical monitoring tasks).

If there is insufficient educational personnel within the system to cover the posts required to meet educational demand, it will be necessary to plan **financing** for new hires. If available resources do not allow covering all needs, it is fundamental to conduct a **prioritization** process, which should focus on allocating available financing to posts with greater urgency, such as those in educational institutions located in more vulnerable contexts.

Figure 1. Implementation Processes for Optimal Staffing



For adequate development of Optimal Staffing implementation processes, it is crucial to have three key conditions: (1) a robust Educational Information and Management System (EMIS) that allows generating, processing, and consolidating information from educational institutions to identify needs and estimate educational personnel gaps in a timely manner; (2) a framework of clear norms and rules that structures each of the processes; and (3) a qualified technical team with high capacity for information analysis and coordination with different involved actors.

2.1 Identifying Necessary Personnel

The first and most important step is identifying necessary personnel, a process that develops in two stages. The first stage consists of determining the **Optimal Functional Staffing (OFS)**, which corresponds to estimating the optimal number of posts necessary to satisfy educational demand. In the second stage, a **gap analysis** is conducted between required posts and the supply of educational personnel available in the system to cover the OFS. This stage also seeks to optimize personnel assignment, ensuring that posts are filled with the smallest possible number of human resources without affecting educational quality. The challenge is maintaining efficient assignment without reducing personnel so much as to affect service quality.

a. Estimation of Optimal Functional Staffing (OFS): How many posts are needed?

Determining an Optimal Functional Staffing (OFS) involves estimating the number of posts necessary in an education system to adequately meet demand. For this estimation to be optimal, it is fundamental to base it on objective criteria and clear rules, with the goal of calculating the number of posts needed (neither more nor less) to satisfy educational needs.

One of the key variables for this estimation is student enrollment. Calculating the number of students who will attend each grade in an educational institution is not a simple task due to the inherent uncertainty in the process. Although posts must be defined before the start of the academic year to organize human resource allocation, the definitive student enrollment may not be completely defined until the last moment. This is due to factors such as high student mobility, transfers between schools, dropout, grade retention, and new system entries. In this context, the exact moment when posts are defined is crucial. Ideally, this should be done annually before the start of classes, but without anticipating too much and coordinated with the budget cycle, which is usually the calendar year, so that enrollment projection is as accurate as possible and reflects the real number of students who will begin the school year.

Beyond the number of students, it is necessary to consider limitations associated with their assignment in educational institutions. Among these, maximum and minimum sizes of school sessions stand out, whose definition is key for efficient resource allocation. While grouping students in very small sessions can generate inefficiencies and lead to creating unnecessary posts, grouping too many students in large sessions can negatively impact teaching quality. Additionally, it is essential to consider students' specific characteristics when defining sessions: cases involving students with special needs, for example, will require lower maximum limits than in regular sessions to ensure adequate attention.

Another determining variable in estimating the OFS is school infrastructure. Building conditions and availability of physical spaces are limiting factors that affect educational institutions' capacity to accommodate students. When post demand exceeds an institution's capacity, it is necessary to evaluate expanding existing infrastructure or even building new institutions. In contexts where there are institutions with low enrollment in nearby locations, merging them may be a more efficient option for optimizing available resource use, as long as student accessibility is not significantly compromised—in terms of distance and travel time. It is important to keep in mind that, particularly, decisions to close or merge schools can generate strong resistance from local communities. Therefore, they must be adopted with special care, based on deep understanding of local dynamics and, as much as possible, through participatory processes that involve affected communities.

Educational level and associated curricula also affect calculating the number of necessary posts. In primary education, for example, the number of posts is usually lower but with greater workload, since the same “generalist” teacher covers many subjects. In contrast, in secondary or high school education, the number of posts tends to be higher, although with lower workload per post, due to curriculum specialization that includes subjects such as chemistry, physics, and biology.

Other factors that can also impact the number of posts are school schedules (partial or full); type of educational offering (regular or technical-vocational education); and specific needs of certain educational institutions—for example, in Intercultural Bilingual Education contexts, or in regions that require serving linguistic minorities, requirements may vary significantly.

Regardless of the parameters used to define posts, it is crucial that they be established objectively. These parameters must consider both efficiency (for example, avoiding formation of very small sections) and quality (ensuring sections are not excessively large).

In turn, parameters must be supported by clear regulations whenever possible. These regulations must specify aspects such as maximum and minimum number of students per section, workload defined in curricula, and limit of students that each square meter in school facilities can accommodate. This minimizes discretionality in post definition and allows objective and optimal estimation, avoiding both shortages and surpluses in student distribution between sessions and educational institutions.

Upon defining the OFS, an educational institution may maintain the same posts it already had or, in some cases, need creation of new posts. For example, returning to the case illustrated in Table 1, if Educational Institution B registers an increase in 7th grade enrollment, leading to creation of a new section “B,” it might be necessary to add an additional post (for example, post ID # “11”) to cover the English subject. Similarly, in case of enrollment decrease, the need to reduce the number of existing posts might arise. What is fundamental is making these adjustments so that there are neither more nor fewer posts than necessary, ensuring efficient and balanced allocation.

b. Gap Analysis and Adjustment: Does the supply of personnel available in the system cover required posts?

The next step is verifying whether there is sufficient educational personnel to cover post needs. This requires analyzing the post situation to identify which are filled and which remain vacant (i.e., without assigned educational personnel). The objective of this exercise is to maximize efficient use of available human resources, optimizing personnel assignment and distribution within the education system.

Gap analysis and adjustments will depend on education system organization and educational personnel hiring characteristics. For example, in Ecuador, teachers are hired full-time with a 40-hour workload, and their assignment is linked to a specific educational institution. Although regulations allow teacher mobilization between schools within the same district, this process is complex and depends on teacher willingness. In the Autonomous City of Buenos Aires (CABA), Argentina, flexibility is even lower, since teachers sign a contract directly with a school and cannot be reassigned to another. In this context, gap analysis must contrast necessary posts with available teachers in the same educational institution, given limited flexibility to reassign personnel to cover posts in other schools.

In Uruguay, on the other hand, there is greater flexibility in teacher assignment to cover vacant posts in different educational institutions, and such assignment can be adjusted each academic year according to demand. Specifically, each year, the system publishes available posts to cover demand, and teachers must apply to occupy them, following a priority order determined by seniority and evaluations. If a teacher cannot complete their workload in an educational institution due to lack of available posts, they can seek additional hours in other institutions. However, gaps may arise if there are no teachers interested in applying for certain posts, which frequently occurs in remote or vulnerable areas, or when, at the end of the assignment process, available posts are dispersed across several educational institutions.

Even when there is greater flexibility in personnel assignment, gap analysis must consider geographical distribution of posts and educational personnel availability. It could happen that in an urban district there are teachers with surplus dedication hours, while in a rural district there are unfilled posts. Although, at an aggregate level, surplus hours in the urban area could theoretically cover posts in the rural area, in practice this solution is not viable, since it is unlikely that urban teachers would be available to travel weekly to distant rural areas.

Policies related to educational personnel's time dedication are another relevant factor. In Brazil, for example, it is established that two-thirds of teacher workload must be devoted to classroom teaching, while the remaining third is assigned to non-teaching duties such as class planning. These regulations must be considered when analyzing teacher availability to cover identified posts, to avoid overloading personnel with excess class hours, which could compromise their performance and teaching quality.

When adjusting gaps between necessary posts and available teachers, it is a priority to optimize existing personnel assignment. For example, if there are two nearby schools, one with more primary level posts than teachers and the other with more teachers than posts, the possibility of a teacher dividing their workload between both schools could be evaluated. This would be viable if educational institutions are close and required specialties and levels match. However, this type of adjustment depends on education system organization, since teacher mobilization between institutions can be complex, as we have already mentioned.

The optimization process in gap analysis and adjustments must consider not only efficiency but also educational quality. We have already noted that optimization can be achieved when a teacher with surplus workload in an educational institution teaches in another institution with unfilled posts. However, a study conducted in Brazil by Elacqua and Marotta (2020) found that teachers who worked in more than one educational institution were less effective compared to those assigned exclusively to one institution. Study results suggest that assignment to multiple institutions is especially harmful when teachers must teach several grades simultaneously, since this significantly increases their workload and effort necessary for class preparation. In this context, allowing teachers to teach in multiple institutions to cover post gaps can be an efficient solution, provided the number of grades they must teach is limited. This would help reduce the burden associated with class preparation and minimize the impact of traveling between different schools on their workload.²

In summary, it is fundamental to analyze gaps between required posts and existing personnel supply within the education system, prioritizing adjustments in post and personnel assignment to optimize human resource use before considering new hires. However, if the gap persists and cannot be resolved with available personnel, it will be necessary to move to the next step: managing necessary financing to cover unmet needs.

In this sense, it is important to differentiate two optimization processes. The first occurs in the Optimal Functional Staffing definition phase, where **the optimal number of posts**—neither more nor less—is determined based on demand criteria such as student enrollment and curricula, among others. The second process takes place during the

²To understand the situation of teachers working across multiple schools in contexts like Brazil, see Moriconi et al. (2024).

analysis phase of available personnel supply to cover these posts, where **the optimal number of professionals** to cover those posts is defined, avoiding both over-staffing and under-staffing.

In the first optimization stage, for example, it may be necessary to reassign posts from educational institutions with decreasing enrollment or create new posts where an increase in school enrollment is registered. An example of this type of strategy was the merger of school sessions in Minas Gerais, Brazil, in 2019, which affected more than 200 educational institutions after analyzing student distribution to improve physical space utilization (SEE, 2019). Another example is policies implemented in Ecuador for closing and merging small schools, based on educational offering criteria and distance between institutions and students (MINEDUC, 2018). In both cases, the main objective of policies was resource optimization; however, it is fundamental to examine the impact these measures had on educational quality and student access.

In the second stage, possible options could be explored, such as allowing the same teacher to cover more than one post if they have surplus hours in their contract. An example of this approach is the municipal system of Rio de Janeiro, Brazil, where regulations establish specific rules for schedule organization and teacher assignment, allowing professional mobilization between schools to meet service needs. According to this regulation, the teacher's teaching workload should be completed primarily in the same school unit; however, when this is not possible, completion in another nearby educational unit is allowed (SME, 2021).

This type of exercise is not trivial, since public policy officials must not make decisions solely to maximize resource optimization; they must also consider other fundamental objectives, such as promoting educational quality and equity. For example, in indigenous communities or different nationalities, it may not be viable to merge schools, even if they are small and nearby, due to linguistic and cultural differences. Similarly, when merging sections, student composition must be considered, since indiscriminate merger can harm those with special educational needs or lag situations, who require smaller classes and personalized attention. Additionally, in teacher mobilization to cover posts in different schools, working and logistical conditions must be considered; for example, assigning a teacher to two schools on the same day may be unfeasible.

2.2 Financing Unfilled Posts

Once the educational personnel gap is identified, it is necessary to seek financing to cover it through hiring additional personnel. This process may or may not include negotiation with the Ministry of Finance, depending on the nature of required financing. For example, if hiring involves permanent budget lines that will affect the national budget long-term, such as insurance benefits and pension commitments, approval and negotiation with these ministries is usually indispensable.

If hiring is done through temporary contracts, in some countries negotiation with the Ministry of Finance may be limited to securing budget resources to finance it. An example of this is Panama's temporary teacher program, known as Temporary until end of year (THFA). In this case, if the Ministry of Education has resources within the annual budget to hire additional temporary teachers and cover system gaps, it can proceed. On the other hand, in Ecuador, both hiring temporary teachers (under "occasional contracts") and permanent teachers (with "definitive appointment") must be negotiated and approved by the Ministry of Finance, reflecting more rigorous centralized control in educational personnel resource allocation.

Whether through permanent or temporary hiring mechanisms, what is fundamental is that financing be based on detailed and concrete gap analysis, using updated and reliable data that supports the need for new hires. Since resource negotiation with Finance Ministries can be a complex process, due both to public resource limitations and education's competition with other sectors, such as health and security, it is crucial that this negotiation be supported by objective and solid data about human resource financing needs. This not only significantly increases the probability of capturing Finance Ministries' attention but also strengthens the case for securing required resources.

Once financing is approved to cover vacant posts, these can be assigned at central, territorial, or directly at educational institution levels. For this, it is fundamental to understand how financial resources reach the education sector and how they become posts assigned to educational institutions. In some systems, posts are created in territorial offices, such as districts or regional offices. For example, when regulations allow managing posts once they are budgetarily assigned to an educational district, personnel mobility between educational institutions within the same district tends to be easier. In contrast, if posts and personnel are directly assigned to educational institutions, there is greater certainty that these posts respond to detected needs, and this could limit flexibility to redistribute personnel if necessary.

2.3 Priorizing Posts

This last stage depends on whether, during the financing process, necessary resources were obtained to cover the complete personnel gap. If additional financing is secured to cover the complete gap, the personnel assignment process to posts should proceed according to usual norms and practices and respond to previously identified needs.³

In case that, during the negotiation process, the assigned budget is insufficient to cover all gaps, it will be essential to include an additional prioritization stage to determine which posts will be covered first, whether with teachers already on payroll or teachers to be hired. For example, priority could be given to attending educational institutions in vulnerable rural areas, with multigrade structures, in urban-marginal zones, or those serving minority populations, such as Afro-descendants, migrants, or indigenous peoples. Educational institutions with specific curricular characteristics could also be considered priority, such as those of Intercultural Bilingual Education, specialized ones, or technical training ones. Applying these criteria ensures that educational personnel deployment contributes to equity, quality, and efficiency objectives.

When it is necessary to prioritize posts, it is crucial to review and reinforce optimization efforts to reorganize educational offering so that demand can be met—avoiding, for example, students without teachers. Although this is not the ideal scenario, education systems must have management strategies that allow them to face scenarios where budget resources are insufficient. These strategies must carefully evaluate the implications of each decision to minimize their impact on education system effectiveness and equity.

3. The subsequent processes for filling these posts (such as competitive examinations for hiring teachers, which involve bringing external personnel into the system) are beyond the scope of this note. We address this stage more systematically in other studies; see, for example, the works of Bertoni et al. (2020), Bocarejo et al. (2022), and Aguilera et al. (2023), which analyze teacher hiring processes and highlight ways to fill posts more objectively, transparently, and equitably.

Enabling Conditions for Implementing Optimal Staffing

For successful implementation of Optimal Staffing, three conditions must be met that guarantee adequate process execution: (1) having an effective Educational Information and Management System, (2) having a solid institutional framework, and (3) having a technical team trained to carry out implementation.

3.1 Effective Educational Information and Management System (EMIS)

An EMIS is a comprehensive system that encompasses processes supported by legal, institutional, and technological infrastructure, designed to record, process, generate, and disseminate strategic information, contributing to efficient management of public education systems (Arias Ortiz et al., 2021). Ideally, an EMIS covers all operational aspects of education systems, from early childhood to secondary education, and includes both pedagogical processes and monitoring and evaluation of learning and school progression, management and monitoring of teacher assignment and student enrollment.

For optimal functioning of Optimal Staffing processes, it is fundamental that the EMIS be digitized, interoperable, updated, and verified. Digitalized EMIS eliminates limitations associated with manual data handling, reducing errors, optimizing time and resources, and allowing more agile information flow at all education system levels. Additionally, digitization facilitates automation of critical tasks, such as calculating personnel needs and issuing early alerts, which improves response capacity to changes within the system.

Interoperability is another essential pillar of a good EMIS. It refers to the capacity of different systems, information and communication technologies (ICT), and processes to exchange data and share

information and knowledge (Lueders, 2004; Serinco, 2019). In the educational field, it is important that different data within the sector be integrated—for example, that student enrollment information can be easily linked with section and school data, and that these, in turn, be connected with teacher data—as well as with data from other sectors, such as conditional transfer programs or civil registry. This cross-referencing capacity is fundamental for accurately estimating educational personnel needs and gaps. Similarly, interoperability is only possible if unique identifiers are available for each EMIS element, which allows cross-referencing between different databases.

For good OFS functioning, it is fundamental to have constant data updating. All elements involved in its calculation are highly dynamic: students transfer between schools, teachers take leave, retire, among other changes. Having updated information about what happens in educational institutions—preferably in real time—is key to continuously assessing personnel needs. This not only improves planning but also allows responding quickly to unforeseen changes.

Constant monitoring of inputs that feed the EMIS is also indispensable for ensuring that information is verified. This monitoring can be done both *ex ante*, through field visits, and *ex post*, through audits, to validate that reports provide reliable data. This process allows identifying and correcting errors in early stages and creates incentives for correct data reporting. This is especially important, since data manipulation or falsification can generate inefficiencies in Optimal Staffing calculation, artificially inflating demand and leading to overestimation of personnel requirements. In Latin America, cases of “ghost students” or “ghost schools” are not uncommon, where non-existent students or inactive institutions were reported that continued receiving public resources, evidencing the risks of not having robust verification mechanisms.

Finally, while it is possible to manually perform calculations to estimate OFS and assign personnel—for example, using tools like Excel—having a digital platform integrated with the EMIS for OFS management is fundamental for ensuring efficiency, consistency, and traceability of the entire process. This platform must allow analysis and determination of post needs based on objective and parameterizable indicators, aligned with school curriculum requirements. Thus, real-time gap analysis is facilitated, optimizing resource allocation and ensuring greater equity, educational quality, and transparency. By automating critical tasks like OFS calculation, time and resources are freed, allowing technical and management teams to focus on pedagogical and institutional

management aspects, which in turn contributes to more efficient and effective strategic planning. Additionally, considering the complexity of variables involved in OFS and advances in artificial intelligence, it is possible to leverage these tools to increase speed and precision of personnel needs analysis and their gaps, as well as to perform simulations that optimize their assignment.

3.2 Institutionalized OFS Processes

To guarantee sustainability and continuity of processes aimed at estimating and addressing educational personnel gaps, it is fundamental that they be institutionalized. This ensures clear and structured organization, with a schedule that considers key system moments, such as the start of the academic year and budget cycle. Additionally, institutionalization is key to protecting process objectivity from political changes, avoiding that decisions related to staffing definition be influenced by particular interests.

Institutionalization not only ensures sustainability but also transparency. Transparency, as an inherent part of planning, ensures that decisions about teacher staffing planning are made openly, reducing the risk of discretionality or favoritism. This implies, for example, publication of criteria and parameters used for calculations, as well as technical justification of adopted decisions. A transparent approach not only strengthens confidence in management processes but also establishes an accountability mechanism that incentivizes correct application of public resources.

Additionally, it is crucial that parameters determining Optimal Staffing calculation be supported by clear regulations. For example, minimum and maximum class sizes must be formally defined, as well as distribution of teaching load between teaching and non-teaching hours. Having these institutionalized parameters not only ensures calculation sustainability but also prevents arbitrary modifications from year to year. This regulation, by establishing clear and stable rules, contributes to transparency, allowing territorial managers to understand and consistently apply criteria for organizing educational offering and personnel assignment.

3.3. Specialized Technical Team

Beyond institutionalization and a robust EMIS, it is crucial to have a technical team specialized in calculating and managing Optimal Functional Staffing. The existence of a specialized team ensures both technical knowledge and necessary dedication that this complex process demands throughout the academic year.

Similarly, it is essential that team profiles have deep knowledge of key processes, such as student assignment and enrollment, teacher retirement, and general educational personnel management. This is because Optimal Staffing planning involves integrating multiple factors related to resource allocation and budget. Additionally, responsible professionals must have solid understanding of current regulations governing demand determinants, such as laws and regulations establishing curriculum, teacher workload, and teacher-to-student ratios.

The team must include people with advanced competencies in data management and statistics to make precise estimates of personnel gaps. In some cases, it is also necessary for them to have basic knowledge of finance and budget, given that educational personnel needs are directly related to budget requirements and possible resource optimization strategies. They may also have specialized technical support.

Given that Optimal Staffing processes may be new for some education systems, it is essential to implement specific training processes for responsible teams. This training must be adapted to different education system levels, considering each one's roles and functions. For example, it is fundamental that educational institution administrators clearly understand how to report their schools' needs through the OFS and how to identify gaps when comparing demand with available supply.

Conclusions

Ensuring efficient educational personnel management is a fundamental pillar for improving education system quality and equity. As mentioned, this exercise is performed with various degrees of formality, sophistication, and precision by all education systems. Implementing an Optimal Functional Staffing allows precisely estimating educational personnel needs, ensuring that each educational institution has adequate human resources to meet student demand without incurring inefficiencies.

However, achieving this objective requires a comprehensive approach based on three key pillars: a robust Educational Information and Management System that provides updated and reliable data for decision-making; a clear and well-structured regulatory framework that provides stability and transparency to planning processes; and a highly trained technical team capable of strategically managing personnel assignment.

Additionally, it is essential that education systems implement monitoring mechanisms that allow adjusting and optimizing post and personnel distribution based on changes in enrollment, pedagogical needs, and budget availability. Flexibility in human resource allocation is also key to responding to diverse contexts, avoiding both teacher shortages in vulnerable areas and personnel over-dimensioning in institutions with lower demand. However, it is fundamental that personnel distribution optimization does not compromise educational service quality.

Finally, ensuring sustainability of these processes implies effective coordination between education, finance, and other government ministries, as well as use of advanced digital tools for data management. Only through rigorous planning, based on evidence and supported by solid institutionality, will it be possible to guarantee that each student receives quality education with the support of a well-distributed and adequately qualified teaching team.

Glossary

Personnel Gap: Difference between the number of necessary posts, determined by the Optimal Functional Staffing (OFS), and the supply of personnel available in the education system. This gap can manifest both as a deficit (lack of coverage of created posts or non-existence of posts necessary to meet demand) and as excess personnel assigned relative to the optimal amount defined by OFS. Personnel gap analysis must consider all educational management levels, from the micro level (each school), through intermediate scales (districts or educational regions), to the macro level, which encompasses the entire education system. This approach allows identifying imbalances in personnel distribution and optimizing their assignment equitably and efficiently.

Role or job title: A formally established position within the education system that is part of an official organizational structure and can be tracked over time—that is, its creation, modifications, and closure are documented and verifiable. Each role corresponds to a unique position within the education system (such as within the Ministry, Secretariat, or Department of Education, depending on the country) and is associated with a defined set of tasks and responsibilities, such as “primary school principal,” “secondary school teacher,” or “school librarian.” Roles also imply a defined work commitment, typically specified in weekly hours, and may include both full-time positions and those based on hourly teaching loads.

Educational Team: The group of professionals that make up a school’s organizational structure, with emphasis on pedagogical and management posts. A considerable part of Optimal Functional Staffing refers to teachers to be assigned in the education system, but may also deal with principals, pedagogical coordinators, tutors, counselors, and others. Other terms used throughout the text to refer.

Post Financing: Process through which budgetary resources are allocated for the creation and coverage of posts in the education system, ensuring their sustainability over time.

Unique Identifiers: Codes assigned to each element of the education system (posts, teachers, students, educational institutions, classrooms) to ensure their traceability and facilitate interoperability between systems.

Interoperability: Capacity of information systems to exchange data in an integrated manner, facilitating the management and analysis of educational information.

Teacher Mobility: Capacity of the education system to reassign teachers between educational institutions based on demand and current regulations. Mobility may be limited by geographical, administrative, or contractual restrictions.

Post Optimization: The appropriate number of posts according to demand variables (e.g., enrollment, curricula, etc.). For example, some inefficiencies may arise when sections are too small and could be grouped together, or when they are too large and need to be divided.

Personnel Optimization: The optimal number of educational personnel to cover the number of necessary posts, avoiding both overload and insufficient workload. An example of inefficiency is assigning a teacher with surplus workload to one section when they could take on more sections to complete their work schedule.

Optimal Functional Staffing (OFS): Number of posts necessary in an education system to meet school demand efficiently, ensuring a balance between personnel availability and educational service quality. Its determination is based exclusively on pedagogical, social, and infrastructure criteria, without considering acquired labor rights or political decisions related to staff allocation. The OFS represents the ideal workforce planning for a school and the educational system.

Post: A specific assignment of a role to an educational institution. It may be filled or vacant and its existence is subject to financing. For its identification and complete description, each post should include the following attributes:

Subject: The curricular content that must be taught by whoever performs this post (the set of content is called subject, course, or specialty).

Hours: Total weekly work hours involved in occupying the post.

Role: (see above).

Required Role: The type of role with specific functions required for its performance in that post.

Assigned Role: The formal role assigned (the role ID) to cover the post (in some cases, there may be none assigned, and the post remains vacant).

Educational Institution: The educational institution to which the post belongs

Student Group / Sections: Details the group of students to be served, specifying grade, division, and shift according to the teaching modality

Unique Post Identifier: Code or key that uniquely identifies the post throughout the education system.

Post Prioritization: Process through which post allocation is defined when available resources are limited. It is based on criteria of equity, demand, and specific needs of the education system.

EMIS (Educational Management and Information System): Set of educational management processes designed to record, analyze, generate, and disseminate strategic information online, within a specific legal, institutional, and technological framework. An EMIS must allow efficient management of key education system processes at all levels (central, regional, and school), integrating the use of new technologies (Arias Ortiz et al., 2019).

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