Applying Systems Thinking to Education: The RISE Systems Framework

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Introduction

The last 30 years have seen dramatic success in the expansion of schooling access and attainment for children around the world. Education systems in the majority of low- and middle-income countries have become very successful at achieving schooling for all (or nearly all) children. However, they persistently fail to produce learning for all (Pritchett, 2013; World Bank 2018). The World Bank estimates that 53 percent of children in low- and middle-income countries, and nearly 80 percent of children in low-income countries will reach the end of their primary schooling without being able to read a simple text (World Bank, n.d.). Recent analysis also shows that this problem has been getting worse, not better overtime. Analysing repeated cross-sectional data on years of schooling and literacy across 88 countries shows that the "quality" of schooling—defined as the literacy rate of adults with a given level of schooling—was either stagnant or declining in most developing countries between 1960 and 2000 (Le Nestour et al., 2021).

It is not just the poorest and most marginalised who are being left behind. Even children from households among the socio-economic elite in many low- and middle-income countries fail to master the basics (Pritchett and Viarengo, 2021). If the majority of the children in an education system lack the foundational skills needed not only to succeed in higher levels of education but also to reach their full potential as adults, then education systems are failing to deliver on one of their fundamental objectives.

How is it that education systems have succeeded in expanding schooling access and grade attainment, and yet consistently struggle to achieve learning for all? How can governments, donors, and civil society better understand the constraints to the achievement of foundational skills in national education systems and identify priorities for reform? An accurate and comprehensive diagnosis of why education systems persistently deliver poor learning outcomes is the first step in understanding how national education systems can transform into learning systems, capable of delivering high quality education to all.

Key Points

- Many education systems in low- and middle-income countries are experiencing a learning crisis. Many efforts to address this crisis do not account for the system features of education, meaning that they fail to consider the ways that interactions and feedback loops produce outcomes.

- Thinking through the feedback relationships that produce the education system can be challenging. The RISE Education Systems Framework, which is sufficiently structured to give boundaries to the analysis but sufficiently flexible to be adapted to multiple scenarios, can be helpful.

- The RISE Framework identifies four key relationships in an education system: politics, compact, management, and voice and choice; and five features that can be used to describe these relationships: delegation, finance, information, support, and motivation.

- This Framework can be a useful approach for characterising the key actors and interactions in the education system, thinking through how these interactions produce systems outcomes, and identifying ways to intervene that can shift the system towards better outcomes.

This essay summarises a framework for understanding education systems that specifies the systems' components and the ways that those components interact to produce or undermine learning for children.[1]

Discussions of systems thinking in education can sometimes induce eye-rolls and groans. It is perceived as too theoretical, the purview of academics who want to develop theories and donors who want to spend money on "capacity building", far removed from the practical, pressing concerns facing country-level decision makers and implementers.

But systems thinking can be a useful approach to diagnose the problem so that solutions that address the needs of a particular education system can be identified. If too little water is coming out of your tap, increasing the water pressure might seem like an obvious solution. But if the cause of your slow waterflow is a leaky pipe, raising the pressure might just exacerbate the problem. Since education systems are complex, a structured framework for characterising their features can help identify problems and the way towards solutions to overcome them.

To deliver learning for all children, the interactions between teachers and students in tens of millions of classrooms around the world will need to improve. Conventional wisdom asserts that those who wish to be useful to "policymakers" should provide actionable solutions. But an approach that starts with a solution in mind and tries to adapt that solution to fit the context is much less likely to succeed than an approach that starts with a careful definition of the problem and then makes an effort to develop a solution (Andrews, Pritchett, and Woolcock, 2017). Rushing to point to a solution to improve teacher–student interactions ignores the fact that teachers and students are embedded in larger systems that might be the cause of their poor performance and that determine the scope for intervention to improve it.

This essay opens with a discussion of what systems thinking is and how it can be useful in understanding outcomes in service delivery sectors like education. Next, it presents the RISE Framework for understanding education systems. Finally, it illustrates why a systems perspective—and the RISE Framework in particular—are useful for understanding the outcomes in education systems and for moving beyond a description of problems towards a diagnostic understanding of why the problem exists and how it can be addressed.

Systems thinking

A system is a set of elements that are connected to each other by feedback relationships and organised in a way that achieves a function (Meadows, 2008). Ecosystems are a very familiar example of a system.

Table 1 shows a simplified illustration of the elements, relationships, and functions of the marine ecosystem.

Table 1: Simplified illustration of the components of a system

System	Elements	Relationships	Functions and emergent properties
Ocean life ecosystem	Sun, chemicals, water, fish, seaweed	• Sun shines • Water is heated by sun • Fish get oxygen from water and put carbon dioxide into the water • Seaweed takes carbon dioxide from water, and light from sun to grow, it puts oxygen into the water • Fish eat plants, excrete nitrogen, die and decompose to fertilize seaweed • Fish eat other fish • Plants use nitrogen to grow	• Sustain life • New species evolve • Struggling species get extinct

Source: Author's illustrative example based on Meadows, 2008

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[1] This framework builds on, adapts, and expands a general accountability framework for service delivery in the 2004 World Development Report "Making Services Work for the Poor", adapted to education systems in a 2015 paper by RISE Research Director Lant Pritchett, and further illuminated by research and synthesis as part of the RISE Programme.

The elements of the system are its visible components, but the crux of the system are the feedback relationships between the elements, which produce the functions, or emergent properties of the system. Often, the functions of the system are not the explicit goal of any individual system's element (Meadows, 2008). Sun, water, chemicals, plants, and animals all interact to produce the marine ecosystem. But the sun does not shine so the seaweed can grow, and the seaweed does not grow so that it can feed the fish.

Though systems are made up of their elements and the relationships between them, they exist as ontologically distinct "things" from those elements and relationships. Studying the individual animals and plants of the marine ecosystem reveals some useful information, but studying the interactions between the species and how these interactions produce system functions can reveal a great deal more.

Because the system's properties are produced by interactions between elements, interventions in the system that focus on one element can have unintended consequences. To take a specific example from marine life, in the Pacific Northwest killer whale populations have been steadily rising since the mid 1980s—a victory for conservation of this endangered species. At the same time, though, Chinook salmon populations have been declining. Both species are protected under different provisions of the endangered species act, but provisions of the law only allow for interventions that protect individual species. There are no provisions for interventions to support the ecosystem when both a predator and prey species are designated for protection (Marshall et al, 2015). An element-by-element approach is insufficient in this case; a solution that takes the interactions and the overall system into account is needed.

Systems thinking for education

It can be easy to grasp the connection between the feedback relationships and emergent properties of tangible systems, like that of ocean life, but it can be harder to see these connections in social systems like education. This is why developing a framework for studying education systems that clearly identifies the elements, relationships between them, and resulting system functions is so helpful.

Education systems are made up of elements that include people acting in specific roles, like teachers, students, and parents; organisations, like schools and ministries; and things like classrooms and teaching materials. These elements interact with each other via relationships: the parents send their children to school, the teachers teach the students, the teachers are employed by the school, and the school is managed by the ministry, and so on. As with the economy, the functions are revealed by the results of the interactions among the elements, but they might include: teaching foundational skills, ensuring a minimum number of years of schooling are reached, or socialisation to a national identity.

Table 2: Elements, relationships, and functions of an education system

Elements	Relationships	Functions and emergent properties
Teachers, parents, students, schools, ministries, teaching, and learning materials	• Parents send children to school, into the teachers' care • Teachers teach students • Teachers are employed by schools to teach students • Schools are managed by the ministry • Parents and communities pressure ministry for education policy in their interest • Ministry sets standards for teaching and learning materials	• Teaching foundational skills • Ensuring minimum years of education • Socialisation into a national identity

Source: Author

Distinguishing between symptom-only and diagnostic thinking

Medicine is one area where systems thinking is essential. When a person gets sick, their symptoms can be treated one by one, but correctly diagnosing their ailment first is likely to lead to a better outcome.

Table 3 shows a (highly stylised) list of symptoms and treatments for a mystery ailment. Without a correct diagnosis of what is making the patient ill, treating the symptoms might offer temporary relief, but it cannot offer a cure. Moreover, in some cases treating the patient without an accurate diagnosis could lead to prescriptions that do more harm than good.

Table 3: Symptoms and possible treatments of disease

Symptom	Symptom treatment	Possible diagnosis	Possible diagnostic treatments
Fever	Fever reducer	• COVID-19 • Influenza • Bacterial tonsilitis	• Plasma with COVID-19 antibodies • Tamiflu • Antibiotic
Cough	Cough suppresant		
Sore throat	Pain killer		
Aches	Pain killer		
Weakness	Hydration		
Chills	Warm blankets		
Sweating	Cold compress		

Source: Author

Poorly performing education systems face many problems. Poor teacher training, poor teacher attendance, poor teaching materials, high dropout rates, and poor learning outcomes are all symptoms of a poorly performing education system.

One way to think of these symptoms is as potential "proximate determinants" of the low learning outcomes of a particular child. A child might emerge from her basic education without foundational skills because her teachers were not adequately prepared to teach her, because there were inadequate or inappropriate teaching and learning materials in her classrooms, because she dropped out of school, or because of some combination of these and other factors. We could point to any one of these as the "cause" or proximate determinant of her low learning outcomes at the end of primary school (Pritchett, 2015).

To improve outcomes, the interactions between teachers and students have to change. Those who want to help facilitate that change often begin by asking: "What needs to be different about this classroom for the student to emerge prepared?" This line of thinking leads to a focus on all of the symptoms mentioned above. A well intentioned NGO or government official interested in improving outcomes might observe that there are no textbooks in a classroom. Having identified this symptom, they might reasonably think: "There are no textbooks in this school, so we will provide textbooks. Students will be able to study at home now, follow along better in class, and their learning will improve."

The problem with this symptom-only way of thinking is that it fails to acknowledge that the teacher and student are embedded in a larger system. It doesn't ask why there are no books in the classroom in the first place. Failing to develop a diagnostic understanding of the problem can lead to a false conclusion about the cause, and to an intervention solution that has little effect on learning (see the example below).

Since education systems in developing countries face so many constraints, symptom-only thinking is tempting. Examples abound of project or programme interventions that look like the "symptom treatments" in the right-hand column of Table 4. Textbooks are missing, so provide them; teachers are absent, so monitor their attendance and enforce it with payment rewards or punishments; students drop out, so provide cash incentives for them to stay in school; and so on. Moreover, the symptom-by-symptom approach is also conducive to the "project dominated" approach to education aid favoured by many donors, making it even more attractive to the sector (Nino Zarazua, 2016).

Table 4: Symptom by symptom treatment of the education system

Symptom	Symptom treatment (programme)
Students lack textbooks	Provide textbooks
Weak teaching	Teacher training
Teacher absenteeism	Cameras in classrooms
Students drop out	Scholarships
Weak management	Management training
Poor teacher motivation	Raise teacher salaries

Source: Author

All too often programmes are designed to address one of these symptoms, are implemented faithfully, and yet fail to improve learning outcomes. When a programme fails to have the desired impact, it is tempting to look for a devil in the details, some aspect of programme design or execution that could be tweaked to produce better performance. But often the devil is in the system, not in the details (Silberstein, 2020). The programme failed not because of a design flaw, but because of its overall incoherence with the rest of the education system.

One example is a 2009 study of the distribution of textbooks to Kenyan schools. An RCT found no effect of the books on pedagogy or average test scores, but a positive effect on test scores of the best performers. The authors noted that the textbooks were in English and so were inaccessible to most of the students, who could not read English well. The books were the standard government textbooks for this grade level, so the fact that they were in a language that most children could not read reflected the overambitious, elite orientation of the Kenyan curriculum at the time. The intervention was designed under the assumption that lack of resources for textbooks was the constraint to performance in Kenya. But, as the evaluation revealed, the deeper cause of poor performance in the Kenyan system was a curriculum that moved too quickly and left students behind (Glewwe, Moulin, and Kremer, 2009). This type of systemic misalignment is common in education systems in low- and middle-income countries (Hwa et al, 2020).

A second example can be found in a study of a teacher policy reform effort in Indonesia in the early 2000s. The 2005 Teacher Reform Law, as originally proposed, aimed to improve teacher quality by providing financial incentives for teachers to receive higher certifications that were meant to include rigorous external assessment. Pressure from teacher lobby groups diluted the law, and the certification process eventually adopted was a much weaker portfolio submission process and two-week training for those who did not pass. The reform ultimately resulted in the near universal doubling of civil servant teacher salaries (World Bank, 2013; de Ree et al., 2018). Researchers worked with the government to randomise the rollout of these increases so that teachers in a group of treatment schools were able to have higher pay sooner, allowing for an assessment of the effects of the salary increase. They found that while teachers were more satisfied with their jobs, the pay increase had no effect on teacher attendance, subject knowledge, or student learning (de Ree et al., 2018). Changing just one element of teacher's employment—their salary—without changing anything else about the system that the teachers were embedded in did not change their behaviour.

A final example comes from a more recent study conducted as part of the RISE Programme. In this case, a randomised evaluation studied a large-scale management reform meant to improve teacher performance initially implemented in Madhya Pradesh, India, and then scaled to hundreds of thousands of schools nationally. The programme was modelled on state-of-the-art management approaches, and process evaluations revealed it was implemented faithfully. The results? No impact could be detected on any of the performance indicators the study followed: student absence, teacher absence, monitoring and support by managers, or student test scores. The bureaucrats responsible for implementing the programme filled out paperwork and developed plans for improving schools, as they were required to, but when it came to transforming these plans into actions and changes in teachers' behaviour, the programme broke down. The authors found a "disconnect between the programme's objectives and how it was actually perceived by those implementing it" (Muralidharan and Singh, 2020, p. 20). In other words, there was an incoherence in the system, not in the details (Silberstein, 2020).

These examples do not prove that providing more textbooks, higher teacher wages, or school improvement plans do not contribute to student learning. Instead, they show that attempts to address these individual problems without considering the wider system are likely to fail.

The shortcomings of the symptom-by-symptom approach underscore the need for a framework that can illuminate the true functions and incoherences of education systems. With a clear picture of these, policymakers can design reforms and interventions that bring the system into alignment with learning objectives.

The RISE Systems Framework

The RISE Education Systems Framework[2] provides the scaffolding for considering the key elements of an education system, the relationships between them, and the ways in which these relationships operate to produce the system's functions.
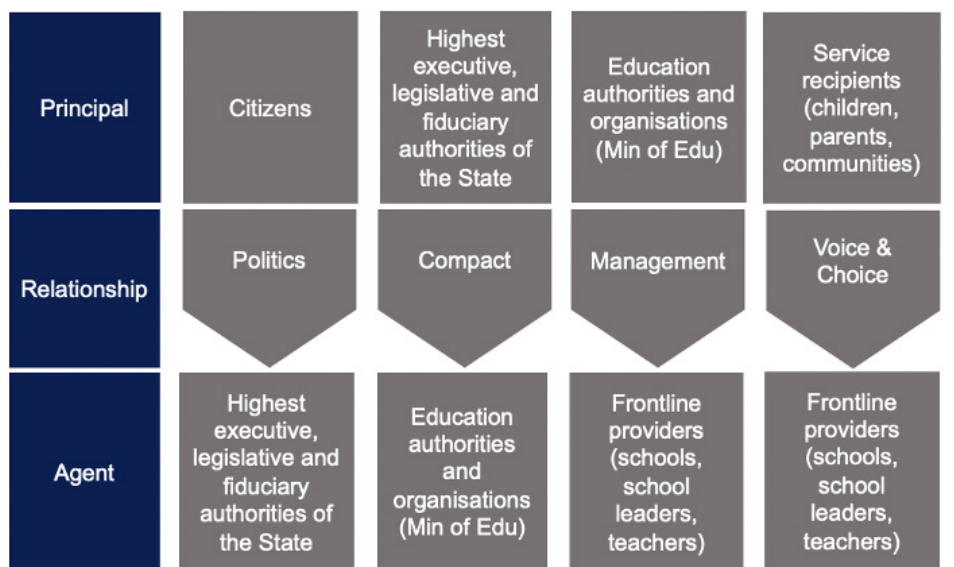
Elements

The elements are the range of actors who are a part of the system. This includes individuals playing specific roles (described here as groups) and organisations.[3] Chief among them are: citizens; highest executive legislative and fiduciary authorities of the state; education authorities; school leaders; teachers; parents; children; and communities.

Relationships

In considering the relationships between the elements of the system, the RISE Framework draws on the paradigm of a principal-agent relationship. A principal-agent relationship is a model used to describe a situation where one actor (the principal) wants a task accomplished, so they engage another actor (the agent) to complete the task. The principal sets out what is expect of the agent and how the agent will be rewarded for completing the task(s) the principal lays out—in other words, how the principal will hold the agent accountable.[4]

The RISE systems framework assumes four key relationships of accountability in an education system.

Figure 1: Four accountability relationships in the education system

Principal	Citizens	Highest executive, legislative and fiduciary authorities of the State	Education authorities and organisations (Min of Edu)	Service recipients (children, parents, communities)
Relationship	Politics	Compact	Management	Voice & Choice
Agent	Highest executive, legislative and fiduciary authorities of the State	Education authorities and organisations (Min of Edu)	Frontline providers (schools, school leaders, teachers)	Frontline providers (schools, school leaders, teachers)

Source: Adapted from Pritchett, 2015

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[2] Sometimes referred to as the "5x4", or the "accountability triangle".

[3] The discussion includes "things" or artifacts like teaching materials and classrooms as systems elements. While these can be considered elements of the system, the RISE Framework focuses on principal–agent relationships between individuals or groups and organisations, and artifacts of the system are not included in the framework.

[4] This is why the RISE Framework is sometimes referred to as the "Accountability Framework".

Politics is the relationship between citizens[5]—the principal—and the highest executive, legislative, and fiduciary authorities of the state—the agent. The citizens can act in their role as the principal in the politics relationship in a number of different ways. These include participating in elections, participating in party activities, and engaging in civil society activities. While the mechanisms through which these activities operate differ between democratic and non-democratic regimes, they are relevant to both (Edsyclopedia, Politics-Delegation). The executive authority of the state is usually embodied in a President, Prime Minister, or other chief executive. The role of the legislative body in education and budget-setting differs across countries, so its importance in the relationship of accountability varies. The fiduciary authority (i.e., organisation(s) within government that make decisions about budget allocations) usually rests in the Ministry of Finance. Since in most countries the Ministry of Finance is tightly controlled either by the executive or the legislature (depending on how budgeting is conducted) the framework groups them together as a joint agent in this relationship. The politics relationship is the starting point of what has been termed "long route of accountability" because, while the ultimate accountability for service delivery originates with citizens, that accountability passes through political leaders and government agencies before reaching the frontline, where services are actually delivered.

Compact is the relationship between the highest executive, legislative, and fiduciary authorities of the state— the principal—and education authorities and organisations—the agent. The principal in the compact relationship is the highest executive, legislative, and fiduciary authority. The organisations and individuals that comprise the agent in the politics relationship are the principal in this relationship. In this way, the principal in the compact relationship acts as a conduit to convey the objectives of the politics relationship to the organisations responsible for delivery of education.

The agents of the compact relationship include the Ministry of Education. In many systems there are other government or non-government organisations that executive, legislative, and fiduciary authorities also delegate education responsibilities to. These can include national curriculum boards, regulatory agencies, or religious authorities who run schools in parallel with the Ministry of Education.

A second set of agents in the compact relationship are private sector actors in the education sector—for example, private schools and private providers of textbooks and other education materials and services. These private actors are another group of organisations, alongside government agencies, responsible for delivery of education. They are often regulated by government and operate with the implicit or explicit permission of government. In this sense, they are an agent of the highest executive authorities.

Management is the relationship between education authorities and organisations—the principal—and school leaders and teachers on the frontline—the agents. In some education systems the management relationship exists within a single organisation—the Ministry of Education. This would be the case if all or most education functions fall under the remit of a single ministry. In others the relationship is more complicated, with multiple organisations in the "education authority" role, and each with their own set of frontline workers. For example, in some systems there are schools that fall under the authority of the Ministry of Education, and other schools that are managed by a religious authority.

The management relationship also includes interactions on a smaller scale, such as between an individual and their boss (i.e., school leaders and teachers), but the framework emphasises the relationship between the leaders or centre of the education organisation, and the frontline providers. This emphasis on the main centre-frontline relationship is partly because every education system's configuration of smaller-scale management relationships is unique to how authority and discretion are distributed in that particular context.

Voice and Choice is the relationship between recipients of services, parents, children, and communities—the principal—and the providers of services, school leaders, and teachers—the agent. To the extent that there is any power in the voice and choice relationship, this is the direct relationship between parents and community members and the teachers and school leaders who serve their children. Students, parents, and communities can hold schools and teachers accountable for education primarily in two ways: through exercising their voice to exert pressure on a school or teacher to change, or by using exit (i.e., choice) to leave a school or teacher they are unhappy with and select

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[5] Using the term citizen here is not intended to suggest that the views and needs of non-citizen residents are not important in the politics relationship. Instead, this is partly a term of convenience and partly a term to highlight the importance of electoral politics in many contexts.

a different one. Parents can form school committees or parent associations to enhance their ability to exercise voice. Parents exercise choice as an individual decision, not intending to have a systemic effect, but the collective choices of many parents to shift from one school to another, or out of the public sector and into private schools, can have significant effects on the education system overall (Edsyclopedia, Voice & Choice). Local communities can also exert pressure on schools via representative local government, village groups, or traditional leaders, who can use their platforms to pressure schools and sometimes also control the provision and use of supplemental funds to schools.

School leaders and teachers are in the particularly challenging position of being accountable to two different principals. They are directly accountable to parents and communities in the voice and choice relationship, but they are also accountable to their supervisors at the school or district level, in the management relationship.

Figure 2: The "accountability triangle", a graphical illustration of the relationships between the various elements of the system.
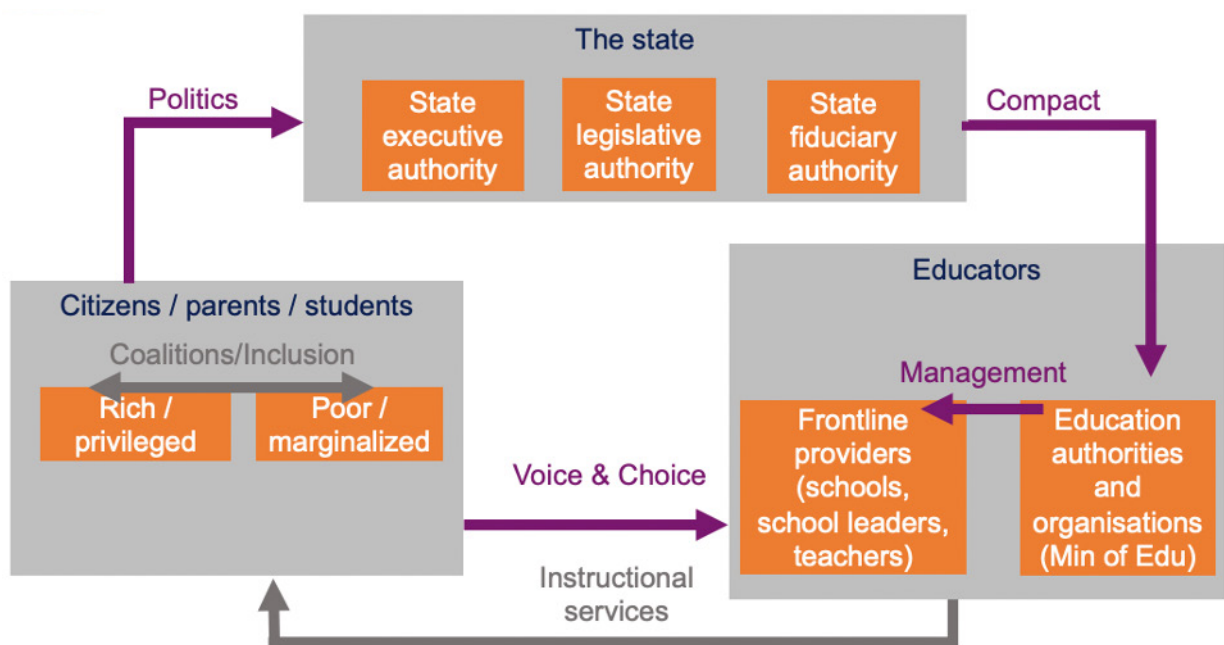
Source: Adapted from Pritchett, 2015

Relationship features

There are five features that are helpful for analysing each relationship. These design elements describe the nature of the relationship between the principal and the agent in terms of what the principal asks the agent to do, how the principal equips the agent to do it, and monitors and incentivises their performance.

Delegation is what the principal wants the agent to do. For example, in the management relationship the Ministry of Education delegates what should be taught to students via the curriculum.

Finance refers to the resources the principal has allocated to the agent to achieve their assigned task. For example, in the compact relationship the Ministry of Finance allocates budget to the education authorities to carry out educational activities.

Information is how the principal assess the agent's performance. For example, in the voice and choice relationship parents can gather information about their children's school experience by asking their children how they feel about school or by reviewing their children's test scores.

Support refers to the preparation and assistance that the principal provides to the agent to complete the task. For example, in the management relationship the Ministry of Education may prepare teachers for their job by providing pre- and in-service teacher training.

Motivation refers to how the principal motivates the agent, including the ways in which the agent's welfare is contingent on their performance against objectives. This can be extrinsic (mediated by principal) or intrinsic (mediated by agent). For example, in the voice & choice relationship parents or community groups may directly pressure teachers to improve their attendance at school by calling them out in community meetings for failing to do so.

Combining the four key relationships and five features together, as shown in Table 5, produces the RISE Systems Framework.

Table 5: The 5x4 Education Systems Framework

Five features of each relationship of accountability (Principal [P] to Agent [A])	Principal-agent relationships			
	Politics: Citizens and the highest executive, legislative, and fiduciary authorities of the state	**Compact:** Highest executive, legislative, and fiduciary authorities of the State to education authority	**Management:** Education authorities and frontline providers (schools, school leaders, and teachers)	**Voice & Choice:** Service recipients (parents/children) and providers of service (schools, school leaders, teachers)
Delegation: What the principal wants the agent to do.				
Finance: The resources the principal has allocated to the agent to achieve assigned task.				
Information: How the principal assesses the agent's performance				
Support: Preparation and assistance that the principal provides to the agent to complete the task.			e.g., Teacher training as part of new curriculum or pedagogical approach	
Motivation: How the principal motivates the agent, including the ways in which agent's welfare is contingent on their performance against objectives.				
Performance of agent is the endogenous, or organic, outcome of the interactions between the actors in the system. The interaction between the actors in the system are characterised by the design elements of the relationships. Systems deliver learning when strong relationships of accountability align across design elements around learning objectives				

Source: Adapted from Pritchett, 2015

Functions or emergent properties of the system: alignment of relationships and types of incoherence

Education systems deliver learning when strong relationships of accountability are aligned around a learning objective across their design elements. In other words, systems deliver learning when coherence for learning emerges as a feature of the interactions between the elements of the system (Crouch, 2020).

There are at least two alternatives to a well-functioning system that is coherent for learning: 1) interactions among the elements of the system produce alignment around an objective other than learning; or 2) interactions among the elements of the system produce incoherence (Pritchett and Spivack, forthcoming).

The coherence or incoherence among the relationships and their features, and the alignment of the relationship around learning or some other objective, can all be thought of as the emergent properties of the system. The emergent properties of the system are the result of the interactions between the elements. Innovation is an emergent property of an economy, just like a fish's gills colours are an emergent property of an ecosystem. It may seem like there is an "invisible hand" creating the economy or a "mother nature" orchestrating evolution, but these features emerge from system pressures, not from any intentional plan. Similarly, the alignment of the relationships or incoherences in an education system can be outcomes of the system even though they are not intentionally created by any actor in the system.

Alignment of relationships of accountability

The alignment of a relationship of accountability is one of the emergent properties of an education system that the framework can help identify and evaluate. Systems deliver learning when relationships of accountability are coherent around learning objectives, but in many systems relationships are aligned around other objectives.

Examining each relationship of accountability and its features can point towards the overall alignment of the relationship, which may be implicit or different from explicitly stated purposes. An overall alignment can be identified by defining the organisations that comprise each relationship and then asking what delegation, finance, information, management, support, and motivation look like from the perspective of both the principal and the agent in the relationship.

The most common alignment in education systems is alignment for access and attainment. In relationships aligned for access and delegation of objectives, financing of activities, information used to evaluate performance, support to improve performance, and motivation to deliver are all geared towards expanding the number of children in school and the years of school they complete. The alignment for access and attainment in most education systems is evidenced by the rapid expansion in enrolment and grade attainment over the last 50 years.

While alignment for access and attainment is most common, alignment for other purposes can also be a feature of relationships and systems. These others include:

*   Learning: Elements of the relationship of accountability are aligned around learning objectives. Clear learning objectives are delegated. Financing is sufficient and sufficiently flexible to achieve learning objectives.

*   Access and attainment: Elements of the relationship of accountability are aligned around expanding enrolment and grade attainment.

*   Socialisation: Relationship is characterised by a socialisation or ideological goal.

*   Clientelism: Relationship is characterised by short-term political objectives, education system is deployed as a tool of clientelism.

*   Special interests: Relationship is characterised by protection for special interests. Special interest groups, such as teachers' unions that have become dominated by partisan priorities, dominate the compact relationship. Ensuring that their needs are met becomes the primary focus of the relationship of accountability.

*   Process compliance: Relationship is dominated by support functions (e.g., human resources, information technology, or procurement) and bureaucratic compliance, focus of the relationship is entirely on process compliance.

Relationships may have overlapping or complementary alignments. For example, alignment for socialisation is compatible with alignment for access, as the expansion of an ideological perspective is supported by bringing more children into the school system (Pritchett and Spivack, forthcoming).

Types of incoherence

Incoherence in the system can hinder progress towards learning objectives. The three main types of incoherence can be described in terms of the 5x4 matrix.

- Within a column: incoherence between the design elements within a particular relationship of accountability.

    For example, within a compact relationship, executive and fiduciary authorities (i.e., the Ministry of Finance) may delegate learning improvements but only ask education authorities (i.e., Ministry of Education) for information on enrolment rates. This means that there is incoherence between what is delegated, and the information used to evaluate the ministry's performance. This undermines the delegated objective, as ministry officials shift their focus to what is being measured, rather than what is being rhetorically delegated, weakening the overall relationship of accountability (see Table 6).

- Within a row: incoherence between the relationships of accountability across one or more design elements.

    For example, executive and fiduciary authorities may delegate a focus on access and attainment, but education authorities may try to begin delegating goals around improved learning outcomes. This incoherence in what is being delegated at different levels of the system may cause confusion. It may also result in insufficient finance and support for the learning objectives the Ministry of Education is trying to adopt.

    Within-row incoherence is a particular challenge for frontline providers (teachers and school leaders), who are the only actors in the system who are the agent of more than one principal. As a result, they are particularly vulnerable to incoherence due to misalignment between their two principals.

    For example, education authorities may want to change the pedagogical approach in schools. They can delegate this change, finance it adequately, provide support to help teachers adopt it, and collect information about the adoption. However, if parents are opposed to the change they can pressure teachers to stick to the old approach (see Table 7).

Table 6: Examples of column incoherence

	Politics	Compact	Management	Voice & Choice
Delegation		Executive and fiduciary authorities may delegate learning improvements.(i.e., president's office calls for a new initiative to improve test scores)		
Finance				
Information		In regular reporting on Ministry of Education activities and justification of resource, Ministry of Education is only asked to report on enrolment rates		
Support				
Motivation				

Source: Author

Table 7: Examples of column coherence and row incoherence

	Politics	Compact	Management	Voice & Choice
Delegation			Education authorities introduce pedagogical approach	Parents prefer old approach and express this preference to teachers
Finance			Adequate financing provided to develop and deploy new approach	
Information			Information on adoption of new approach by frontline collected	
Support			Training in new approach provided	
Motivation				Parents and community groups pressure teachers to stick to old approach

Source: Author

To explore the concept of incoherence in more depth, it's helpful to look at a practical example of activities in an education system and analyse the types of incoherence that can stymie success in these activities.

Example of incoherence: Teacher training in a new curriculum or pedagogy

Teacher training programmes are a critical activity through which education authorities support frontline school leaders and teachers, but they often fail to improve learning outcomes. These activities fall within the "Management–Support" cell of the matrix (see the green cell in Table 5). Applying the systems framework can reveal the incoherences at the root of why a seemingly well-designed programme can fall short of a goal to improve student learning outcomes.

A recent experience with a teacher training programme in Rwanda offers a real world illustration, which can be used to explore the different types of incoherence that emerge. In 2016, Rwanda undertook reforms in their primary and secondary school curricula, including to a secondary school subject on entrepreneurship. The reform was aimed at and facilitated a more skills-based and student-centred approach to the subject. A non-governmental organisation (NGO) identified training in the new curriculum as an implementation gap and developed a training programme to be deployed in parallel to the curriculum rollout. The programme included in-service trainings, exchange visits to other schools, and outreach and support. While the curriculum was deployed around the country, the NGO training was only deployed to a randomly selected sample of schools, allowing for a quantitative, randomised evaluation of the trainings' effects on teacher practices and student learning outcomes alongside a qualitative study of teacher and student perceptions of the new curriculum and training.

The quantitative evaluation found that, two years after the training programme was launched, treatment schools saw a six-fold increase in the use of skills labs—extended sessions for conducting hands-on experiential learning activities—compared to control schools (a 52 percentage point increase). The increased use of skills labs in treatment schools went hand in hand with shifts in teacher pedagogy towards greater "student centredness". Despite the encouraging indications about the role that the training played in changing classroom practices, the study found no effect of the training on student's scores on high stakes national exams, nor on tests of financial literacy, entrepreneurship, and non-cognitive skills developed by and administered by the researchers (Blimpo and Pugatch, 2020).

Interviews and focus group discussions conducted with students and teachers alongside the quantitative evaluation offer insights into why a training that succeeded in changing teacher practices in the way that the curriculum change

intended, failed to deliver improvements in students' outcomes. The curriculum reform was not accompanied by exam reform. So while the training did help teachers adopt a more skills based and student-centred approach, in particular scheduling and holding more skills labs, the overall pressure to teach theory and content, as the old curriculum had emphasised, remained. In interviews and focus groups both teachers and students noted this dissonance. Teachers suggested to interviewers that national exams should be updated to reflect the new curriculum, and some reported that they tried to make changes to internal, school-level exams to better reflect the skills-based approach they were now meant to teach. Students in treated schools reported that skills labs and student business clubs (another feature of the new curriculum) were planned and encouraged for Standard-4 and Standard-5 students, but not for Standard-6, the year in which students take national exams, and that that time was used for exam preparations (Anand, 2020).

What incoherences may have undermined the success of the training programme in this case?

Within a column: Incoherence between the design elements within a particular relationship of accountability. The teacher training could have faced a mismatch with the other design elements of the management relationship. The new training could have been incoherent with delegation in the relationship if it were inconsistent with the new curriculum or pedagogy, or if there were insufficient support in general. It could also have been incoherent with the finance of the relationship, if insufficient resources were allocated towards it; with the information of the relationship if the authorities neglected to follow up to determine how the training worked; or with the motivation of the relationship, if teachers and school leaders had little incentive to actively engage in the training or implement the new pedagogy.

This type of incoherence is a prominent feature of this example in at least two ways. First, the business as usual approach of the government offered insufficient support to teachers to prepare for the new curriculum. As a result, the teachers who did not receive the NGO training made significantly fewer changes to their teaching practices than those who received training. Second, the high stakes exams (i.e., information) were not reformed alongside the curriculum, creating an incoherence within the column. Teachers and schools, knowing the importance of exam performance, continued to emphasise the theoretical material that was the core of the old curriculum (Anand, 2020).

Within a row: Incoherence between the relationships of accountability within a particular feature of the relationships. The usefulness of training could have been undermined by misalignments between the relationships of accountability. If the new curriculum or pedagogy featured in the training was inconsistent with executive or fiduciary leaders' priorities, insufficient resources could have been allocated towards it. Moreover, the inconsistency in delegation could mean that some elements within the ministry were pushing the training while others were unconcerned with it, undermining motivation.

The available analysis in this case does not discuss the role that the Ministry of Finance or executive leaders played in the reform, so it's not possible to study within-row incoherence in this case.

Across the rows of two relationships, frontline providers. Frontline providers (school leaders and teachers) are the agents in relationships with both education authorities and parents. The usefulness of the training could have been undermined if it was inconsistent with parents' preferences for their children. If parents are uninterested in, or opposed to the new pedagogy, then even a successful training programme would struggle to be effective, since teachers would face pressure from parents to forgo the new approach.

The analysis of this case does not include information about parents' perspectives, but it does include analysis of focus group discussions held with students. It found that students had a positive view of the new curriculum, reporting that it provided them with some skills to start a small business, despite the fact that it was only partially implemented. Notably, many students in the treatment schools specifically mentioned useful things that they learned during skills labs and from student business clubs, neither of which were implemented in many of the control schools. The generally positive view of the new curriculum from the students suggests that incoherence between the management and voice and choice relationships was not a significant cause of incoherence in this case, though without information on parent or community perceptions of the new curriculum it's difficult to come to a definitive conclusion (Anand, 2020).

Conclusion

The Rwanda teacher training example discussed above, like most of the other examples in this essay, shows how incoherences in the education system can hinder programmes' effectiveness. Overall, education quality has been stagnant or declining in most low- and middle- income countries (Le Nestour et al, 2021), but there are a handful of success cases to look to. Often the roots of successful cases can be traced to the emergence of coherence around learning goals across the system.

Take the case of Vietnam, a system that is widely acknowledged to overperform its peers (in terms of GDP per capita) (Dang et al., 2020). A key feature of the Vietnamese system is a prevalent, nation-wide "all for learning" attitude, demonstrated by high level political commitment to learning from national and party leaders, individual households' financial commitments to education, and general public engagement in education issues, even in the absence of organised civil society in the education sector present in other developing countries. This reflects a high degree of coherence for learning in delegation and finance across multiple relationships of accountability in the Vietnamese system. This coherence around learning exists alongside other features of the Vietnamese system that could undermine performance, such as incoherent decentralisation and persistent inequalities between groups (London, 2021). The Vietnamese system is far from perfect, but it does perform much better than its peers and coherence around learning objectives is a key feature of this success.

Education systems in many low- and middle-income countries have a long way to go to deliver education of the quality that Vietnamese students enjoy. By providing a structured approach to understanding and analysing the components and interactions of an education system, the RISE Framework can help diagnose the problems their education systems face and consider the best ways to intervene to make meaningful improvement.

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