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**Enabling SDG4 quality education in an emerging economy: a case study on India**

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**Abstract**

In the wake of the global pandemic, virtually every country, but especially emerging economies are experiencing a severe learning crisis, where millions of students are expected to lack basic, numeracy, literacy, and life skills. This crisis is further exacerbated by worsening inequality among learners and uncertainty in the job market. As demonstrated by previous studies and acknowledged by the United Nations a reorientation in the current education systems is key to achieving the sustainable development goals. The United Nations has set forth an ambitious vision for educations systems around the world in the form of SDG4. This paper demonstrates the failure of current linear thinking in achieving the goal of equitable and quality education, and the need for a systems approach in education. This report also provides a conceptual framework that is based on the principles of systems thinking, developed using the case of Indian education system, which can be used by stakeholders in emerging economies to raise student achievement and ultimately reach the objective as outlined in SDG4. The paper uses the LEPO framework developed by Phillips, McNaught and Kennedy (2010) to identify the various levers of change and feedback loops that exist in India’s education system. It then explains how these levers and feedback loops can be used to create effective interventions that improve learning outcomes in emerging economies.

**Introduction**

The 17 Sustainable Development Goals (SDGs) adopted by the United Nations member states aim to address major global challenges. These goals and their 169 sub-targets are considered a guideline for governments, businesses, civil societies, and individuals to mobilize their efforts in creating a sustainable and just global society (Mia *et al*., 2020). Researchers and policy makers agree that the SDGs cannot be viewed as fragmented objectives, but rather as interconnected goals. The explicit implication is that progress or failure towards achieving one goal will inevitably impact the progress of others (Dorgo *et al*., 2018). SDG 4 aims to ‘ensure inclusive and quality education for all,’ a goal that is considered a powerful catalyst for change and one that can significantly contribute towards the achievement of other SDGs (Vladimirova and Le Blanc, 2016). For example, researchers found a strong correlation between educational achievement and higher income (Blaug, 1947; Morgan and David, 1963), better health (Ross and Wu, 1995; Cutler and Lleras-Muney, 2006), and active citizenship (Hoskins et al., 2008). As illustrated in appendix 1, progress made towards SDG4 can create progress in almost every other SDG including SDG 1 (reduce poverty), SDG 8 (economic growth and employment), SDG 5 (gender equality), SDG 10 (economic equality) and SDG 16 (peaceful societies).

This paper aims to explore why education systems in an emerging economy, such as India, have had variable outcomes. For example, while some regions (such as Uttar Pradesh and Bihar and Madhya Pradesh) succeeded in expanding access to education, these regions also fail to deliver satisfactory learning outcomes (Tripathi, 2019). Another illustration of variable outcomes is demonstrated in urban areas and the State of Kerala, where they have achieved high enrolment and literacy (98% in Kerala) and where reading and numeracy skills of primary school goers are on par with developed nations (Mathew,1999), but employability is desperately low (Remadevi and Kumar, 2018). The net effect is a highly qualified workforce, but no work and consequent brain drain as skilled workers head overseas (Zachariah and Rajan, 2020). Building on these contrasting and contradictory local examples, this paper develops a systems-based approach to understand these varied outcomes and support progress of SDG 4. This paper argues in favor of developing a system thinking framework for education systems in emerging economies, using the case study of India. This framework can be used by education stakeholders in emerging economies to guide their education policies.

The objective of this paper is to demonstrate the failure in the current linear thinking of education policy makers to consider the complex and interconnected nature of education systems. For example, while government bureaucracy reports rising school enrolment in primary and secondary schools (NAFSA, 2022; Ministry of Education, 2023), participation rates by gender are not equal (Das and Biswas, 2021), and learning outcomes are underdeveloped and poor – relying on rote learning, and weak numeracy and literacy skills (Ghosh,2021; Ravi et al., 2019), and the outcomes vary significantly between private and public schools (Goyal and Pandey, 2009; Chudgar and Quin, 2012) and between rural and urban schools (Bandyopadhyay et al., 2021). It is therefore crucial to identify and understand the various components in an education system and explain how they interact with each other to produce the desired learning outcomes.

**Why current thinking on improving learning outcomes is failing?**

The last three decades have seen dramatic increase in the number of children attending schools in the majority of low- and middle-income countries (OECD, 2022). In India, the gross enrollment ratio at primary level was at 97.8% in the year 2020-21 (ASER Centre, 2022). Governments and education systems in these countries have become very successful in achieving schooling for all, or at least nearly all. However, it is also clear that the higher rate of enrollment has not translated to higher learning outcomes or learning for all. World Bank estimates that 53 percent of children currently enrolled in primary school in middle-income countries will reach the end of their primary schooling without age-appropriate literacy or numeracy skills (World Bank, 2023). Reports show that these children lack the foundational skills that are necessary to succeed in the higher level of education, as well as achieve their full potential as adults. This learning crisis has been worsened by the COVID-19 pandemic, which caused widespread school closures.

Education reforms in India in the recent years have failed to produce results because they have failed to consider the nonlinear complexity in education systems (Bisaliah, 2016). For example, initiatives by the Uttar Pradesh government in the last decade to increase the salary of teachers had no significant effect on learning outcomes and led to increases in abuses such as selling of teaching posts in the open market (Kingdon and Muzammil, 2013). Another effort, which provided teachers with fixed-term contract with the objective to increase their motivation also had little effect on student learning achievements (Kingdon and Muzammil, 2003; Levačić, 2009; Kingdon and Muzammil, 2013). Other efforts, such as peer teaching programs (2007), remedial classes (Banerjee, 2007), technology-assisted curriculum (Banerjee, 2007), and teacher cash bonus programs showed negligible positive results when implemented at scale. Recent studies have also shown that increased public spending does not lead to improvement in learning outcomes (Ur and Gerard, 2021). There is sufficient literature to prove that education efforts that do not consider the systems’ factors and context, do not improve learning outcomes.

**A Systems approach to education**

Systems thinking is a way of analyzing and understanding complex systems and their interdependent components (Anderson and Johnson, 1997). It involves looking at systems, rather than focusing on individual components (Arnold and Wade, 2015). A system is a set of elements that are connected to each other by feedback relationships and organized in a way that achieves a function (Meadows, 2008). Under the terms of this definition, the LEPO model is a conceptualization of the three major comp0onents involved in any teaching and learning environment directed towards desired learning outcomes (Phillips et al., 2010).



**Figure 1: Model of the LEPO framework (Phillips, McNaught and Kennedy, 2010)**

As illustrated by Figure 1, the environment (within the school and the external environment that reflects at a macro level the State and Federal government, but also at a micro level families and communities. These components of the system are captured in Figure 2 that shows an illustrative national education system with key properties produced by the interaction between its elements. Any intervention that is focused on one element alone will likely have poor system level outcomes and possibly incur unintended consequences. For example, a 2016 study found that school inspections, an important element of accountability in public schools in emerging economies such as India, forced school management to misrepresent data, which ultimately had negative impact on the education system. From a systems perspective, any process must recognize that everything is interconnected and that changes to one part of a system can have both positive (growth) and unintended (school management playing safe and/or misreporting performance) and even unrealized (lack of innovation and loss in confidence by both educators and students) consequences throughout the system (Arnold and Wade, 2015).



**Fig 2: An overview of the national education system in India showing identified keys levers and feedback loops**

Figure 2 represents the national educational system in India and its various components. Fundamentally, the system is made of policy makers in the form of the Central government and the various governments at the State and local levels, private and public educators, and the learners and their surroundings that include their family members and the general society. These components are the levers of the system, that can be leveraged to create positive change within the system. The government at the center sets up the agenda for all education stakeholders in the country through the National Education Policy every few decades. The governments at various levels control and manage the system through the bureaucrats who typically demonstrate top-down linear thinking and imposes inherent systemic norms on the rest of the system. The policy makers influence the educators through regulation that is often created based on the political and caste ideologies of the ruling party. The educators, made up of teachers, school management and those who design and implement the curriculum, make up the second component. The students, their parents and the society make up the third component.

Research demonstrates that the education system in India is capable of achieving small-scale changes that are mission oriented and time bound. However, when it comes to embedding and institutionalizing new reforms, the system fails. Often times, these changes result in increasing the magnitude of existing problems, as well as creating new ones. Take the recent ‘Delhi model’ of development in education, for example. The Delhi government went on a mission to revive the public education system by creating model classrooms that are equipped with latest technology, highly researched curriculum, and well trained teachers. In reality, this created a double-tier system within the public school system of Delhi, that ultimately drained even more resources from poorer schools, leaving over two hundred thousand students at a disadvantage (Natinoal Herald, 2022).

As demonstrated in the figure, the bureaucracy is an important lever of change within the education system in an emerging economy such as India. Any systemic change will require designing interventions that can incentivize the bureaucracy to work with the political executives going beyond conflicting interests and overlapping roles (Dasgupta and Kapur, 2020; Nyadera and Islam, 2020). The figure also demonstrates various feedback loops that exists between the government, educators, and the students and the family. Educational investments should take into account these loops.

What is not shown in Figure 2 are the many regional variations across the country that are characterized by language, rural/urban divide, gender bias and political ideology. UP, for example, has a strong ideology based on caste identity and religion (Patel, 2022), while Kerala and Tamil Nadu – both southern states, have a socialist ideology that has emphasized education and welfare, and a growing away from caste identities (Varghese, 2021). An important side note in an already complex society is the example of Kerala, which was the first region to democratically elect a communist government that has remained influential over five decades (Varkey, 2019).

As the LEPO model and Figure 2 illustrate collectively, for education systems there are key components playing specific roles like teachers, students, and parents, institutions like schools and Government ministries, and physical entities such as classrooms and educational resources. These components are interdependent and connected through various relationships. For instance, parents enroll their children in schools, teachers educate students, schools employ teachers, and government ministries oversee the management of public schools.

Desired learning outcomes include literacy and numeracy skills development that are necessary, but more important is the development of independent learning abilities that enable career and life aspirations (Meyer, 2008) because it can enable them to become autonomous (Lau, 2017). Conversely, as illustrated by Kerala, the wider context of work is also important. Having achieved strong literacy and numeracy skills, governments must answer the call for meaningful work.

**A review of the current linear approach to education**

Education systems that are performing poorly in India show several linear symptoms. For example, the State education system in Uttar Pradesh has low teacher attendance, poor teaching materials, high dropout rates, and poor student outcomes (Tripathi, 2019). In linear thinking, any or all these symptoms are pointed out as the reasons for low learning outcomes among the students of UP. This leads the policy makers to treat these symptoms without acknowledging the fact that students and teachers are components of a larger system. This can lead to wrong conclusions about the cause of a problem. As a result, any advancement of SDG 4 objectives that are based on such limited, linear conclusions will likely fail to produce any meaningful results that are sustainable and supportive of long-term improvement not just in quality education, but also some of the other SDGs.

This linear thinking is evident in the education investments made by the Uttar Pradesh government (and other State governments) in the past. For example, the ongoing effort to provide every student in public school with textbooks assume that students perform poorly due to lack of textbooks and if they are given enough textbooks, they will be able to study at home as well as follow along in class better, leading to better learning outcomes (Hindustan Times, 2022). However, this solution fails to consider how other factors such as student motivation, home environment, attitude of parents, psychological development of a child, etc. affects the learning of a child. Similarly, facilitated by Covid, the general and widespread access to online learning represents opportunity yet fails because of other environmental considerations such as limited access to internet and more fundamentally to electricity (Das et al, 2020). There are also limited access to computers at home (Van Capelle et al., 2021), compounded by resident cultural norms that place a stigma on online learning and support a bias towards the male child (Mathrani, 2020). Teaching process, especially the use of active learning is also highly questionable. Moreover, the measurement of learning outcomes in an online test is flawed, because even if a student performs well in them, it does not mean that they have achieved the desired reading, comprehension and analytical skills that are required in a 21st century digital environment (Van Capelle et al., 2021).

Linear thinking can similarly be observed in most of the policies and efforts adopted by both governmental and private stakeholders. For example, if teacher attendance is low, the immediate response is to introduce a nationwide program that was meant to incentivizes them to show up (launched in Andhra Pradesh). The program failed, but also resulted in teachers gaining incentives to attend but not with any evident impact on learning outcomes for the students. Similarly, students are dropping out because of the pressure from their families to become economic contributors. The linear response, without an appreciation of the need for proper governance, is to provide families with cash incentive to encourage children to show up in school. But this has led to corruption and the benefits not reaching the intended families (Economic Times, 2016). A further example, is if school management is found to be ineffective, give them training and incentives to achieve higher results. Such programs, even when they are implemented well, fail to show long term results as they are only to address symptoms (poor performance of school management) and not the underlying causes (cultural attitudes, family economic pressures, managerial corruption, and weak school governance).

**Conclusion**

A systems approach outlined by the LEPO model highlights necessary change that is nonlinear and non-additive in nature, and where the output is not necessarily proportional to the input. In other words, learning outcomes are not simply the results of factors such as attitude of students, availability of resources, quality of teachers and efficiency of the management. An effort to improve any one of these factors does not guarantee improved learning outcomes. Instead, because systems are interconnected and characterized by feedback loops, there is a non-monotonic relationship between its components as shown in Figure 1. Conversely, Figure 2 illustrates the contextual state of play across the respective key stakeholders in India. The image is an illustration of key processes and some regional tensions and disconnection – weak governance, gender biases and other local norms that discourage sustained outcomes, as well as family based economic pressure and poor accountability by school managers.

The items identified in Figure 2 as notional levers for change (government, school based, classroom based, and family based), and the feedback loops highlighted address core issues such as curriculum, access to resources, skills of teachers, evaluation of teaching, governance structures and most of all to think longer term- after quality education, then what? The failure to answer that question satisfactorily is illustrated by Kerala, where high literacy without meaningful work opportunity has been self-defeating as it led to under-employment and emigration of educated workers. In effect, this issue shows that all the SDGs are strongly interconnected, and SDG4 specifically, as illustrated in Appendix 1, is shown to impact SDG 8,9,10,16 and 17. Turning to actions, context determines actions and actions for quality education, and so too for all other SDGs, will need to vary, for example, by country (developed/ less developed economies), by region (the North and East of India representing a significantly different challenge to Kerala and Tamil Nadu in the South. As well, there is a clear need to accommodate the urban and rural divide, as well as related social-religious structures that act as barriers to change. Above all, as shown in Figure 2, there is a deficit in governance and accountability, and successful change will need to be supported by good governance structures at all levels of society.

**Appendix 1**

Summary:

There are 17 SDGs identified by the United Nations. These SDGs are integrated—that is, action in one area will affect outcomes in others, and development must balance social, economic, and environmental sustainability. What are some ‘human’ considerations and a possible pathway to achieving the goal? You may want to consider implications for small business and business corporations, as well as general society. Are there likely obstacles? Use the OB model as a guiding framework and be sure to justify your conclusion in response to the task.

<https://www.undp.org/sustainable-development-goals>

**Task: Is it transformational change or a wish list?** Complete a critical review of a selected SDG from the perspective of a national government – imagine you’re a policy advisor to a Minister in charge of implementing the goal. Please cite a minimum of 6-7 recent (2016 onwards) journal articles.

**Exemplar** **paper**: aside from suggested [readings](https://moodle.maynoothuniversity.ie/mod/folder/view.php?id=446075), I have included a exemplar CT paper. Please note the format, style (report structure, use of references and Reference List) and overall presentation. No harm seeking to emulate this report.

**Referencing**: Please note you must use in-text referencing and the basic Harvard Referencing style. See p17 of the handbook for more details. The exemplar paper also illustrates in-text referencing - such as (Thomas 2010) and a Reference List (at the end of your essay/ report/ document).

**Appendix 2**

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Source: Vladimirova and Le Blanc (2016)

**Appendix 3**

**Characteristics of a systems thinking model**

According to Ludwig Von Bertalanffy, who is widely considered to be the father of systems thinking, the following are the features of a typical system:

1. **Subsystem interaction** - The effectiveness of a system relies on the interaction of distinct components or subsystems that communicate effectively, whether with clear or ambiguous messages. This can be compared to the coordination of organs in the human body or the communication between software programs in solving an engineering challenge.
2. **Feedback between subsystems** - Feedback between subsystems in a system refers to the exchange of information or signals between the different components or parts of a larger system. This feedback can be positive or negative and can have significant effects on the behavior and performance of the system. In positive feedback loops, the output of one subsystem is used to reinforce or amplify the output of another subsystem, while in negative feedback loops, the output of one subsystem is used to counteract or reduce the output of another subsystem. The effective management of feedback between subsystems is crucial for maintaining the stability, efficiency, and overall performance of complex systems.
3. **Hierarchy among subsystems** - In a system, subsystems can be organized in a hierarchical manner to better understand the relationships and dependencies between them. Organizing subsystems in a hierarchical manner can help in understanding how changes or modifications in one subsystem can affect other subsystems within the system. It also helps in identifying the critical subsystems and their importance in the overall functioning of the system.
4. **Levers** - In systems thinking, a lever is a point of intervention or leverage that can be used to create significant changes in a system. It is a concept that originated from the work of Donella Meadows, a pioneering systems thinker, and author of "Thinking in Systems". A lever in systems thinking is a specific action or intervention that can be taken to shift the behavior of a system. It is a strategic point of focus that can be used to create positive or negative feedback loops within the system, thereby changing the overall behavior of the system. By identifying and leveraging these levers, systems thinkers can develop strategies to create positive change within complex systems.

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