Policy Brief

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Learning to Leapfrog: Innovative Pedagogies to Transform Education

Summary Findings

Center for Universal Education at BROOKINGS

This policy brief summarizes the findings of *Learning to Leapfrog: Innovative Pedagogies to Transform Education*, a report written by David Istance and Alejandro Paniagua.

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The Leapfrog Imperative

Countries around the world have increased access to schooling in the past few decades; however, that progress has not led to universal high-quality and future-ready education. The world today faces a global learning crisis,[1] with the 2030 Sustainable Development Goals for education far from reach. Though many of the world's children are in school today, 263 million children remain without access.[2] For the children and young people that are in school, they are often not learning. Poor-quality schooling is an issue in all countries but is most pronounced in developing countries and for the most marginalized children. For example, a shocking 86 percent of primary school students in low-income countries are not proficient in mathematics.[3] Education, even in high-income countries, is not succeeding in embedding the knowledge, skills, and dispositions that societies and economies demand. What is more, the current pace of change is far too slow. In many countries, it will take approximately 100 years for those furthest behind to catch up to the learning levels of today's highest achievers.[4]

One factor for the global learning crisis—though certainly not the only factor—is that many countries have not invested sufficiently in teachers for their expanding school systems.[5] Surprisingly, there have been dropping proportions of trained teachers in a number of world regions at both the primary and secondary levels, and this drop is especially pronounced in sub-Saharan Africa, where just 64 percent of primary school teachers and 50 percent of secondary school teachers have received appropriate training.[6]

Addressing education's challenges and shortcomings will require not tinkering around the margins but rapid, nonlinear progress, which is what the Center for Universal Education (CUE) at the Brookings Institution calls leapfrogging. Making a serious dent on improving inequality while educating all students for the 21st century calls for widespread educational innovation.[7]

This policy brief provides a synthesis of the report titled *Learning to Leapfrog: Innovative Pedagogies to Transform Education* that was written by David Istance and Alejandro Paniagua. The report builds on CUE's 2018 book titled *Leapfrogging Inequality: Remaking Education to Help Young People Thrive*, which argued for the importance of educational leapfrogging, thereby creating transformative shifts rather than incremental evolution as educators harness the power of innovation. The report has also drawn extensively on existing literature, especially related to pedagogies, teaching, and learning. It uses the foundational analysis of pedagogy established through the authors' earlier Organisation for Economic Co-operation and Development (OECD) work, *Teachers as Designers of*

Learning Environments, including the six clusters of innovative pedagogical approaches.[8]

The *Leapfrogging Inequality* book put forth a Leapfrog Pathway that outlines a continuum of actions that should be considered so education can provide all students with the full breadth of skills they need to thrive and become successful life-long learners. The pathway presents essential shifts in two domains: first, transforming teaching and learning experiences to make room for playful learning and, second, transforming the ways in which learning is assessed and recognized. The pathway also presents shifts that will be important to transform teaching and learning in many contexts although not all; those shifts diversify the people and places where learning takes place and smartly harness technology and data.

This *Learning to Leapfrog* report takes an in-depth look at what types of approaches are needed to begin to implement the teaching and learning shifts recommended in the Leapfrog Pathway and to embrace the recommendation that playful learning—which means learning experiences that allow for active student engagement, experimentation and iteration, social interaction, curiosity and joy, and meaningful connection to students' lives—can be an integral part of students' educational experiences.

The report argues that innovative pedagogies must be central to any system transformation if leapfrogging is to be achieved; the report also identifies six clusters of such pedagogies and some associated teaching practices that, alone or in combination, will underpin such transformation. Those clusters and related teaching practices are described in section 2 of the report. We have used the shorthand "innovative pedagogies" because we have found it to be a helpful term to frame discussions with the education decisionmakers whom we hope to reach with this report; however, we might have used other terms including "playful" or "engaging." The report then examines enablers of successful implementation of innovative pedagogy, and it focuses on the support and empowerment of teachers, as well as on structural changes in the design of the education workforce and of schools to include hybrid formal and nonformal models.

Finally, the report concludes by reflecting on the depth of transformation that this vision implies for education systems and on how to think about fruitful near-term scaling approaches for those innovative pedagogies through harnessing the power of networks.

The Methodology

A major resource for the report has been CUE's Global Catalog of Education Innovations.[9] That catalog brings together nearly 3,000 cases from around the world, and we have also reviewed cases in the broader literature, including respondents to a 2019 PlayFutures survey. We narrowed down the cases by searching for those in teaching, learning, and pedagogy (specifically, those using playful learning approaches) and with at least basic evaluative evidence of a positive effect.

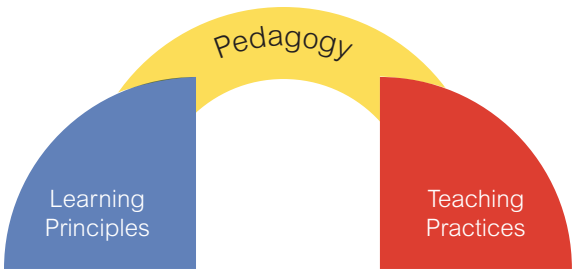
Many of the avenues proposed in this report lack water-tight supporting evidence; system transformation by design cannot have a highly developed evidence base. Yet, given our focus on the emergent phenomenon of innovation and on real-world approaches that comprise combinations (rather than pure treatments) in richly divergent contexts and cultures, there will always be limits to robust proof. Building up educational research systems is a very long-term enterprise. Yet, so urgent is the learning crisis and so clear is the innovation imperative that if we justify inaction because of an imperfect evidence base, we do so at the cost of continuing to fail millions of young people. Hence, we argue that the burden of proof about trying new approaches must be shared equally between the evidence for the fruitfulness of particular innovations and the clear evidence of the failure of the current approaches.

Innovative Pedagogies Are Essential for Leapfrogging

Pedagogy is in the "engine room" of education, where learners, educators, content, and learning resources come together through teaching and assessment practices.[10] Pedagogies are like roadmaps for connecting broad and abstract learning principles with different teaching practices rooted in local contexts. Teachers and schools can use pedagogies both to *deepen* understanding of what they are doing—connecting with learning principles—or to *widen* it by combining with other experiences and by designing their context-specific learning environments. (See figure 1.) Unless there is transformation within pedagogy itself, other changes will have a limited effect on actual student learning. For example, introducing a change to learning resources, such as computers or tablets, will not change student learning if educators' teaching practices remain unchanged.

Figure 1

The Role of Pedagogy



Recent reports of promising innovations have emphasized pedagogy but have not provided depth about what it looks like in the classroom.[11] *Learning to Leapfrog* aims to help fill the gap of policy-related guidance about pedagogy. The report seeks to deepen understanding of innovative pedagogies in two ways: (a) to help education actors better understand how to implement curriculum goals, with pedagogies offering a bridge between content, skills, and competences; and (b) to navigate the innovation landscape by offering roadmaps that we hope will be useful to the range of education actors who are making important decisions across government, civil society, philanthropy, and the private sector.[12]

Unless there is transformation within pedagogy itself, other changes will have a limited effect on actual student learning.

Indeed, when it comes to innovation in education, there is no shortage. Moreover, the diversity of new approaches can be both energizing and overwhelming for education decisionmakers at whatever level of the system they reside: from educators in classrooms to ministers in the halls of national governments. CUE's Global Catalog of Innovations compiled thousands of innovations taking place in 166 countries—and it was hardly an exhaustive list.[13] The majority of

the innovations that CUE compiled focused on playful teaching and learning, and fully half involved technology.[14] However, not all innovations are created equal. For example, despite the major global surge in investment in educational technology—in 2012, the global ed-tech market was estimated at $91 billion and nearly tripled in size to $252 billion by 2016[15]—CUE found that the majority of the ed-tech innovations in the catalog did not have a potential to help leapfrog and contribute to the system transformations needed.[16]

Hence, the report argues that to truly transform teaching and learning, it is essential to tackle pedagogy by harnessing the six clusters of innovative teaching and learning practices. When used well, the clusters can provide the engaged and playful educational experiences students need to cultivate a full breadth of skills and competencies. In any given context or at any given time, educators can use multiple clusters that interconnect and can reinforce each other. The six clusters also offer a diverse range of teaching approaches that can be adapted to local context ensuring cultural sensitivity.[17] Each cluster is shown in figure 2 and is described below, along with illustrative examples.

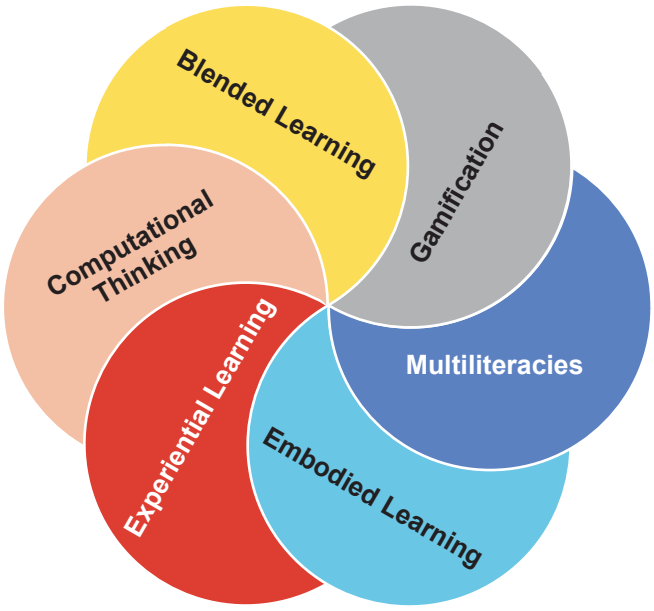
Cluster 1: Blended Learning

Blended learning uses online learning to deliver content in new, more flexible ways and to better differentiate student needs. In a blended learning scenario, students have some control over the content, pace, timing, and location of their learning, which in turn allows teachers to further differentiate instruction that can be based on individual student progress.[18] For countries and schools with limited access to the internet, previously downloaded material can significantly reduce dependence on internet connection. Blended learning should be content-specific and not simply tech-rich.

The rotation model of blended learining is particularly suited to address the goals of leapfrogging. In this approach, a group of students rotate between a school

Figure 2

The Six Clusters of Innovative Pedagogies



Source: Paniagua and Istance. "Teachers as Designers of Learning Environments." (2018, p.78.)

computer lab and face-to-face classroom interactions with the teacher; individual students follow a customized schedule. The rotation model is ripe for leapfrogging inequality because it imposes less pressure on families and students (who may not have computers, internet access, or sufficient study time after school, which are all important components for other blended-learning models such as the "flipped classroom") and on schools that may not be tech-rich.[19]

The rotation model can be beneficial for learners of a second language. For example, in an urban elementary school in the United States, teachers used a rotation model to teach English Language Arts. Each classroom had two to eight computers for student use, or students used computers in the school library. After working with the online component for 20 to 80 minutes per week, for an average of 28.5 weeks, English learners were found to have comparable or greater gains when compared with non-English learners.[20] The

rotation model of blended learning is a promising approach in this case because English learners so often lag behind their peers in reading development.

Cluster 2: Computational Thinking

Computational thinking implies much more than teaching computing in schools. It is a problem-solving process that is central to the academic discipline of computer science, but it can also be applied to other disciplines and does not require the use of computers.[21] This pedagogical cluster moves away from teaching computer skills solely to understand how scientists actually use computers. In the process, the approach makes the sciences, mathematics, and creativity in schools more closely resemble that of professional practice in those fields.[22]

This pedagogical cluster is particularly promising for leapfrogging as a result of its ability to enhance the breadth and depth of the skills most needed to improve learning. The wide range of skills required for computational thinking provides a solid foundation for multidisciplinary learning, including coping with open-ended problems, persisting in challenging cases, reasoning about abstract objects, using models to simulate scenarios, working with ambiguity, breaking down artifacts into smaller parts, and abstracting themes.[23]

An approach that is extremely useful in developed and developing countries is "unplugged" computational thinking, whereby computational, problem-solving skills are taught in a low-tech manner.[24] Unplugged activities embedded in problem-solving stories can produce contextually rich scenarios within which to apply computational thinking.[25] Although going unplugged removes the need for computer access, students nevertheless need to connect and experiment with computational tools and artifacts. This necessity implies some balance between plugged and unplugged activities for the approach to be effective.[26] For example, the unplugged project that is based at Canterbury University in New Zealand offers activities, games, magic tricks, and competitions to show children the kind of thinking that is expected of a computer scientist. The project has enjoyed widespread adoption internationally and has been translated into 12 languages.[27]

Cluster 3: Experiential Learning

Experiential learning covers a group of approaches, including project-based and inquiry learning, that put learners directly in contact with what is being studied. This pedagogical cluster takes human experience as a central source of learning and seeks to incorporate it into teaching and into the design of learning environments.[28] Experiential learning has been classically viewed as comprising four main elements: concrete experience, reflective observation, abstract conceptualization, and active experimentation.[29]

Service-based learning is a promising example of the experiential approach, and it helps students develop competencies and skills that are relevant to their social and economic lives. Service-based learning combines community service with reflection about the action.[30] It fosters student awareness of community needs, an ethic of service, and an understanding of politics and morality, all relevant for developing breadth of skills in students.

An illustration of service-based learning can be found in a project on education for sustainability that was carried out in 12 primary schools in Oyo State, Nigeria. With teacher guidance, students selected an environmental issue and ways to address it, such as making sandbags to control flooding or planting trees to control erosion. Students reflected on the experience in writing and discussion and finally presented their work to their peers.[31] The experience provided a unique opportunity to participate in real-life projects as it addressed environmental issues in the immediate community and thus offered alternatives to traditional approaches to teaching education for sustainability.

Cluster 4: Embodied Learning

Embodied learning uses the physical body and activity in learning and supports the natural learning inclinations of creativity and expression.[32] When cognition is underpinned by fostering self-expression, learning can become a creative, engaging experience for students.[33]

Makerspaces encapsulate many embodied learning principles and have witnessed significant growth around the world. Makerspaces are informal sites, inside or outside schools, for creative production in art, science, and engineering. Students blend digital and physical technologies to explore ideas, learn technical skills, and create new products in a collaborative and playful way.[34] Makerspaces deliberately place students in contexts that require collective skills and knowledge. They help students acquire 21st-century skills of problem-solving, critical and creative thinking, collaboration, and communication.[35] Where resources are limited, the makerspace design should aim for simplicity by using a few strategic tools and materials and by avoiding unnecessary complex technology.[36]

As an illustration of makerspaces, in a community of First Nation students in Canada, a course on construction carpentry and computer-assisted design was reframed to teach students to make electric guitars through studio-design learning. This makerspace approach not only provided students with new hands-on skills but also allowed them to go further and experiment with the skills they acquired. The electric guitars reflected students' personalities in many ways—choice of color, laser engraving, and so on. Ultimately, attendance and achievement increased for students participating in the course.[37]

Cluster 5: Multiliteracies

Multiliteracies as a pedagogical cluster starts from the assumption that language is a sociocultural system that cannot be disentangled from its social function. This cluster, therefore, challenges the widespread conception that literacy consists of basic reading and writing skills. It connects literacy to issues of equity, such as calling attention to elitist school practices, and to the literacy practices in communities in which schools are not so prominent.[38] It also emphasizes the provision of multilingual and multicultural learning opportunities.[39] Multiliteracies as pedagogy can be especially powerful for those learning a second language, because it offers students authentic communication practices to reflect on and recreate their multilingual and multicultural identities.[40]

The report uses the example of bilingual education as a type of multiliteracies approach because of the importance of cultural diversity and the challenges faced by most students from minorities and indigenous groups around the globe. Further, mother tongue and bilingual education have been repeatedly identified as among the most effective practices in developing countries and in the education of diverse communities.[41] For example, in the southern region of Peru where Quechua is spoken, Quechua is now part of a new language policy that promotes its use and visibility. In many urban settings where Quechua is taught, classrooms are racially and linguistically segregated, and Quechua-speaking children with rural backgrounds often lack a legitimate voice. Model classrooms are promoting talk as a cooperative strategy to transform unequal power relationships in the classroom and to empower those who are more proficient in Quechua while bringing to the fore the urban children as new potential Quechua speakers. This approach increases inclusion, motivation, and skills in a safe learning environment of mutual respect; notably, it bridges the gap between reified institutional norms and the lived multilingual reality of students.[42]

Cluster 6: Gamification

Gamification describes the different ways in which the pedagogical architecture of games can be transferred to formal learning settings while maintaining the element of play.[43] Gamification goes beyond "game

designing" and seeks to capture the underlying benefits of game mechanics to immerse students in learning. Rachel Parker and Bo Stjerne Thomsen have identified the positive effect of playful learning environments on a wide range of social, cognitive, and emotional skills.[44] The use of gamification means educators can foster inclusion, experimentation, and immersion.[45]

Quite often gamification is linked: (a) to technology such as digital games and virtual environments; (b) to gaming mechanisms such as badges, goals, challenges, levels, etc.; and (c) to how educators can integrate curriculum content into those games. We focus on two other components of gamification: aesthetics and story, which do not necessarily require technology. Those components form the sensations and narratives that create a level of immersion that the player (student) experiences during the game (learning).[46]

Storytelling is an example of a pedagogical practice that harnesses the gamification approach.[47] Storytelling can build community among students and teachers, enhance memory recall, support early literacy development, and promote creative thinking.[48] Storytelling is also an approach that educators who primarily rely on whole-class teaching, lectures, and traditional drilling can easily incorporate into their teaching. The storytelling elements of gamification broaden the range of pedagogical practices related to teacher talk and revalue oracy as a fundamental pedagogical tool. Teacher "chalk and talk" can be enriched to become appealing storytelling with dialogue and discussion, closed questioning and telling, and greater cognitive engagement. A storytelling program in mathematics in Greece, for example, sparked student interest, reduced anxiety, increased engagement, and enabled alternative explanations of mathematical ideas and principles. Teachers introduced a new mathematical concept by reading a story to students while displaying the pictures accompanying the text. Students engaged in a brief discussion about content of the story and were encouraged to interact strategically and purposefully with both the teacher and the story's content. Thus, students were required to be active participants rather than passive listeners. After four weeks, with four sessions of 45 minutes each, students showed an increase in skills that require greater abstract conceptualization and problem-solving when they were compared to the control group.[49]

Moving Beyond Classroom Walls

Leapfrogging in education is an ambitious and challenging goal; it cannot be achieved only by better conceptualizations and awareness of examples of innovative pedagogies. Although the pedagogical approaches discussed here can help develop the knowledge needed to implement theories and learning goals, we need to look beyond classroom walls to transformations in the conditions in which teaching and learning take place if we expect leapfrogging to fully take root.

Three Structural Changes Are Needed for Innovative Pedagogies to Flourish

For innovative pedagogies to truly take root in education systems, there must be a range of conditions present beyond the changes that any given teacher can make inside his or her classroom. They include everything from policy directions set by leaders of education jurisdictions down to parent and student demand for new forms of learning. For this report, however, we have chosen to focus on three important structural changes within education systems that have a potential to greatly enable the successful uptake of innovative pedagogies across the six clusters. The changes include: (a) investing in teacher professional development and support so as to ensure foundations for quality teaching; (b) widening the profile of educators; and (c) supporting new school models that use hybrid arrangements between formal and nonformal learning. (See figure 3). We have chosen those three because they can provide foundational support for innovative teaching and learning experiences to flourish and because they were evident themes that emerged across geographies from the cases of innovation that we examined. We will briefly examine each next, with further discussion provided in the full report.

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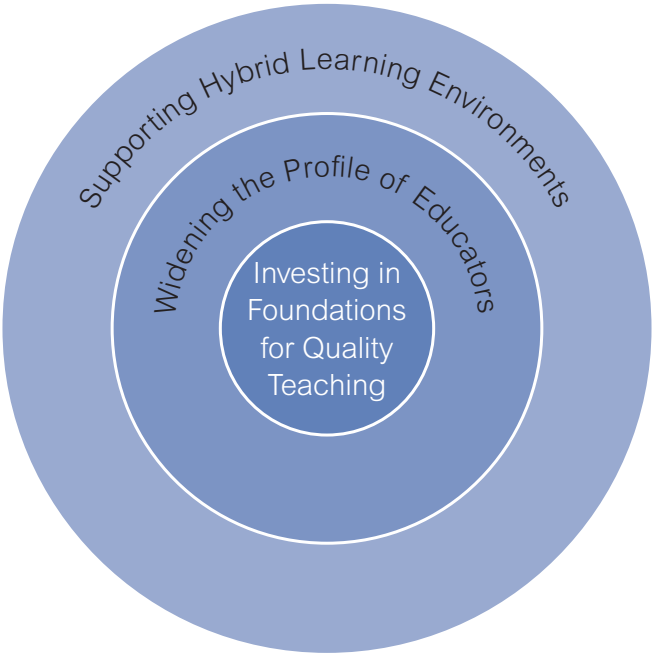
Figure 3

Changes Needed for Innovative Pedagogies to Flourish



Investing in Foundations for Quality Teaching

Quality teaching is fundamental for improving learning outcomes, whether the core skills and literacies or the broader suites of competences that characterize 21st-century curricula. This primacy is echoed in the

Education Workforce Initiative's recent review of literature about the teacher workforce: "High talent teachers remain critical to the education endeavour of improvement in student learning outcomes; in all contexts the student–teacher relationship is central to quality learning experiences."[50]

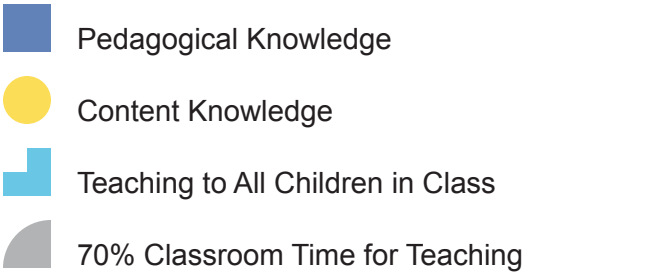
The innovative pedagogies featured in our report highlight teachers' centrality in ensuring student learning. Any thought that teachers are less important than before and that such pedagogies mean students are left to their own devices is inaccurate. The frequency of terms such as "teacher as facilitator" and "the guide on the side" may encourage this misunderstanding; we prefer John Hattie's term of "teacher as activator," which shows teachers' powerful influence on learning outcomes.[51] Given teachers' crucial role in innovative pedagogies, teachers' own learning must be a central plank of the ambition to leapfrog.

Teaching 21st-century skills and using the innovative pedagogies highlighted earlier are not an easy task. We argue that it is essential for education systems to prioritize teacher development and support so they can ensure foundations for quality teaching. Those foundations refer to the basic dimensions of teacher professionalism. Taking the extensive literature about teaching, education, and learning in numerous academic and policy reports, we argue that there are four pillars to secure the foundations for quality teaching: (a) pedagogical knowledge of theories and practice; (b) content knowledge, including pedagogical content knowledge; (c) teaching across the range of children and not simply focusing on the top achievers; and (d) time for teaching with at least 70 percent of classroom time devoted to instruction. (See figure 4.)

Without a minimum of professional competences and supports, teachers are unable to translate pedagogical interventions into classroom practices to have a positive effect on student learning. However, this does not mean teacher professional development programs should wait to introduce innovative pedagogies.

Figure 4

Foundations for Quality Teaching



This approach would suppose a causal relationship between teacher competences, experience, and innovative skills as linear stages. An important reason innovative pedagogies can help develop the basic dimensions of quality teaching is that professional development for and experiences with innovative teaching bolsters teachers' pedagogical expertise. Innovative pedagogy strengthens teachers' pedagogical knowledge and widens teachers' resources to address the diversity of needs in their classrooms. Hence, early career teachers need to be exposed as soon as possible to environments and professional experiences permeated with teaching innovation.[52]

Just as exposure to innovative pedagogies can help develop the foundations for quality teaching, so too does the presence of the basic dimensions of quality teaching provide a platform to introduce innovative pedagogies. Although innovative pedagogies are important, they do not guarantee the basic dimensions of quality teaching, because content knowledge and teaching time depend on other factors beyond pedagogy, such as institutional arrangements, initial teacher preparation, and classroom management. Pedagogical innovation is intertwined with how people learn both the new pedagogies and the more complex capacities and participation in peer networks that are needed for an innovation to work.[53]

Across diverse geographic settings, programs and initiatives are experimenting with new ways of supporting teacher learning that will contribute to developing the foundations for quality teaching. For example, *Un Buen Comienzo* (A Good Start) is a teacher professional development project in Chile; it is designed to improve the quality of early childhood education. It supports schools to improve the teaching practices of classroom teams, taking a whole-school approach and working with each school over a two-year period. The goal is accomplished through coaching—while using an observation tool that assesses interactions between teachers and students—as well as through collaborative work between participating schools. The project includes monthly coaching sessions for teachers, teachers' assistants, and school leadership teams.[54]

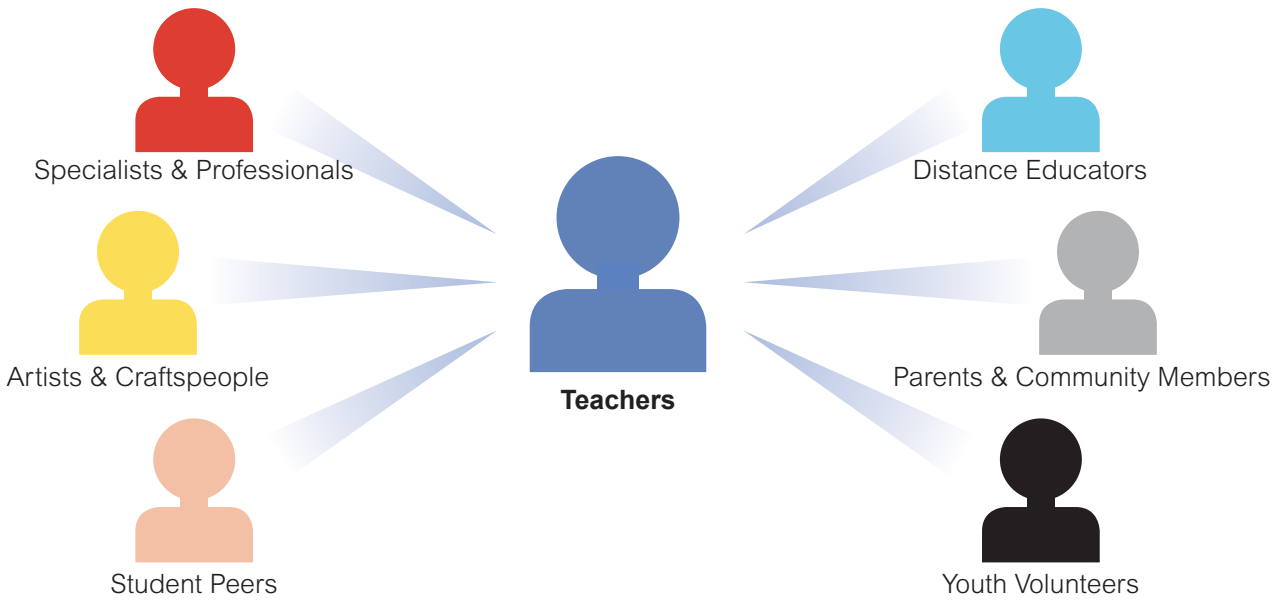
The role and potential of technology feature prominently in the teacher professional development examples we reviewed. Technology may take the form of courses delivered online rather than the traditional face-to-face format; it may be the online provision of teaching materials to back up the teacher learning undertaken; it may be in the creation of online professional communities where teachers grow through sharing and feedback on practice. For example, the C-STEM Challenge is a nongovernmental organization (NGO) program operating in the Dominican Republic, South Africa, and the United States; it offers online training courses for teachers and students in learning communication, science, technology, engineering, and mathematics disciplines.[55] As another example, the Mobile Taleem project in Pakistan gives teachers access to 300 lessons via mobile phone; videos can be viewed offline anytime and from any location. This innovation addresses the problem of content knowledge gaps among primary teachers, particularly in rural areas of Pakistan.[56] Because the content is homegrown, it is also more scalable and cost-effective.

Widening the Profile of Educators

Teachers who have the foundations for quality teaching can provide an important platform for implementing

Figure 5

Widening the Profile of Educators



innovative pedagogies, a platform that can be strengthened by expanding the profile of who is considered to be an educator. This enabling strategy requires a fundamental shift in the design of the education workforce itself. Figure 5 provides an example of the different groups that could participate in the teaching and learning process.

There are several reasons the notion of widening the profile of who can be considered as educators (or at least as actively participating in the teaching and learning process) merits consideration. Perhaps the most frequently referenced is that casting a broader net can bring in support that can help compensate for teacher shortages, especially in disadvantaged areas. While true, this argument must be carefully nuanced so it can in no way be mistaken as meaning that high-quality trained teachers are not needed.

A second argument made is that when other caring adults get engaged in the teaching and learning process, their involvement can unburden educators from some of the many overwhelming tasks they face on a daily basis and hence can help them focus on their teaching. For example, when community volunteers are trained to teach reading, they can tutor students who are lagging behind and can unburden teachers of that task. Again, while this relief of duties certainly can be true in many instances, it will not be true of all cases. Indeed, whether widening the profile of educators unburdens teachers of tasks and helps elevate them to focus on their craft will depend on the type of role that community members play. In many cases, it is possible that their involvement will raise the burden on teachers by necessitating supervision, direction, more sophisticated lesson planning, and the like.

A third argument the report offers for widening the profile of educators—perhaps the most important for supporting the uptake of innovative pedagogy—is that it provides a platform for trained teachers to diversify, deepen, and enrich students' learning. As the report shows in illustrative examples, many of the different pedagogies featured in the six clusters come to life, and some even depend on teaching and learning experiences that draw on a diverse set of expertise and actors inside and outside the classroom. Re-imagining the education workforce to include not only trained teachers who are supported as they deliver quality teaching, but also a wider array of people in a school's community (from professionals to parents to college students to peers) can serve to more readily enable the types of pedagogical transformations that can help leapfrog learning.

Across the many innovations we studied, drawing on artistic expertise was a common example of the extended workforce, especially in those schools that wished to emphasize the arts in their curriculum, including schools using embodied learning. Bridgewater Primary School in Australia has an artist in residence on staff who manages an arts program that includes painting, crafts, sewing, mosaics, wood and metal work, which are available to all students. Another specialist staff member manages the school's garden and involves students in harvesting the produce and preparing food, which has brought an added benefit to the larger community.[57]

Additionally, the innovations we reviewed offer several examples where expert mentors are brought in, both to raise the quality of education and to extend the breadth of skills in the curriculum. For example, Project SEED is a summer program for low-income secondary school students in the United States. It is designed to boost science and math proficiency by bringing in researchers and specialists who can extend existing teacher knowledge; it has shown moderate positive effects on achievement.[58] Another example is the Kenyan Young Leaders program, which links students to alumni who have completed secondary school and who can provide academic support, advice, and leadership advice to younger students.[59] This approach is beneficial for the students and their learning; it also simplifies program planning and recruitment.

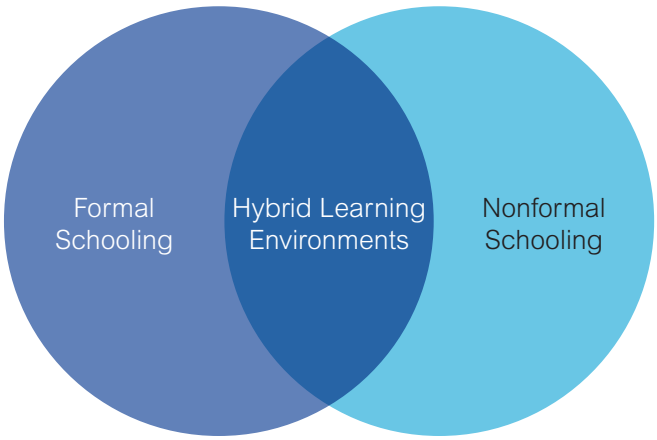
Supporting Hybrid Learning Environments

Across education innovations, the archetypal school classroom is only one setting for learning among many. When the design and delivery of education is extended beyond the organizations of the formal system, new hybrid learning environments are created. The main features of hybrid learning environments are found in diverse mixes of in-school and out-of-school programs and partners (see figure 6). The creation and spread of hybrid learning environments is both a reality of our increasingly complex learning systems and a welcome source of potential dynamism and learning opportunity.

Hybrid learning environments can be particularly helpful for the uptake of innovative pedagogy, because there are limitations as to what transforming education systems from the "inside" can accomplish. Reforming pedagogy, teaching, and learning in structures that remain untouched means that change has to grow within the parameters of a dominant academic model. Transformed practice around the different clusters of innovative pedagogy, however, requires a broader vision of what good learning looks like across a breadth of skills, as well as a broader canvas from which to operate.

Figure 6

Hybrid Learning Environments



The nature of hybrid learning environments means that more players and settings are involved, decisionmaking is more diffuse and negotiated, and leadership more complex. With complexity comes the need for focus and the glue to hold together arrangements that otherwise risk serious fragmentation. If hybrids are not appropriately supported and managed, the result could be worsening quality of both the formal and nonformal arrangements.

Scaffolding, therefore, is needed for the complex hybrid learning environments, especially to enable the organizational learning on which their success depends. Such scaffolding takes different forms but often has emerged as model approaches, based on a particular theory of learning and pedagogies, sometimes with accompanying materials of knowledge, lessons, and professional development. In our review of education innovations, some of the most interesting and powerful hybrid learning environments that provide the much needed scaffolding to ensure quality learning are rooted in community partnerships or rely on technology to connect the different players and sites.

For example, the Akanksha Schools Project in India is a public–private partnership between the Akanksha Foundation and the municipal governments of Mumbai and Pune. Akanksha initially began as after-school centers for low-income students and developed into a hybrid learning arrangement where the foundation schools provide specially developed teaching and learning tools, including worksheets and quizzes to supplement the government-provided textbooks. The manuals for teachers include modules on building self-esteem, with projects on self-development, family, community, the nation, and the world.[60] Another example is the Escola Municipal Professor Paulo Freire School in Brazil, which increases the time and the opportunities for learning by extending school to nine hours a day, thereby extending learning to many more

students, and the school is open to the community. On weekends, the school functions as a social and cultural space to receive families and strengthen relational ties.[61]

An example of a tech-focused hybrid learning arrangement can be found in UNICEF's Connecting Classrooms initiative, which has created a web platform for connecting and engaging students from around the world in cross-cultural discussions. The initiative uses a diverse array of innovative pedagogical practices, drawing from multiliteracies approaches with its cross-cultural engagement and experiential learning approaches with project-based learning work. It enables students in developing and developed countries to collaborate around topics of shared concern such as health and climate change. Both students and teachers use the online platform that is designed for group interaction and collaborative work.[62] Programs offering cultural exchanges via online collaboration are more accessible to students of all socioeconomic background and improve students' confidence in their learning by their being able to communicate with peers around the world.[63]

The three structural changes of: (a) investing in the foundations for quality teaching; (b) widening the profile of educators; and (c) supporting hybrid learning environments will help innovative pedagogies flourish inside and outside the traditional classroom. Yet, expansion of innovative pedagogies, even with those enabling environment conditions in place, won't necessarily happen on their own. The *Learning to Leapfrog* report argues that a focus on scaling innovation is critical.

Scaling Deep Change Is Required to Transform Teaching and Learning

The true implication of envisioning an education system where the innovative pedagogies we have discussed are flourishing is system transformation. Taking the innovative pedagogies seriously implies shifting teacher development, workforce, and school models and pursuing pathways for scaling this change broadly. For leapfrogging approaches to make a difference beyond individual schools and communities means that the innovation of teaching and learning is happening at some scale. There are many isolated brilliant practices and charismatic teachers around the world, but unless new approaches and dynamics grow, the practices remain idiosyncratic and personal.

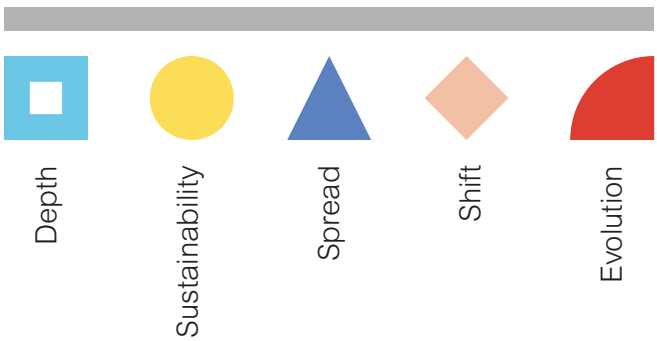
Scaling Deep Change

Learning to Leapfrog focuses on a particular theme: scaling deep change. (See figure 7.) Cynthia Coburn conceptualizes that scaling deep change "goes beyond surface structures or procedures (such as changes in materials, classroom organization, or the addition of specific activities) to alter teachers' beliefs, norms of social interaction, and pedagogical principles as enacted in the curriculum."[64] We use Coburn's work as well as Chris Dede's to denote that scaling deep change comprises five core elements:

- *Depth* refers to deep and consequential change in classroom practice, alteration of teachers' beliefs, norms of social interaction, and pedagogical principles as enacted in the curriculum.
- *Sustainability* means that change has to be more than fleeting; an innovation is scaling if "its use can be sustained in original and even subsequent schools."
- *Spread* is based on the traditional meaning of scaling as diffusion of the innovation to growing numbers of classrooms and schools, but it also means to "spread reform-related norms and pedagogical principles *within* a classroom, school, and district."
- *Shift* requires districts, schools, and teachers, as well as community partners, to assume ownership of an innovation so that it becomes internalized rather than externally imposed and run.[65]
- *Evolution* means the way in which the "innovation as revised by its adapters is influential in reshaping the thinking of its designers, creating a community of practice that evolves the innovation."[66]

Figure 7

Scaling Deep Change



Leveraging Networks and the Missing Middle

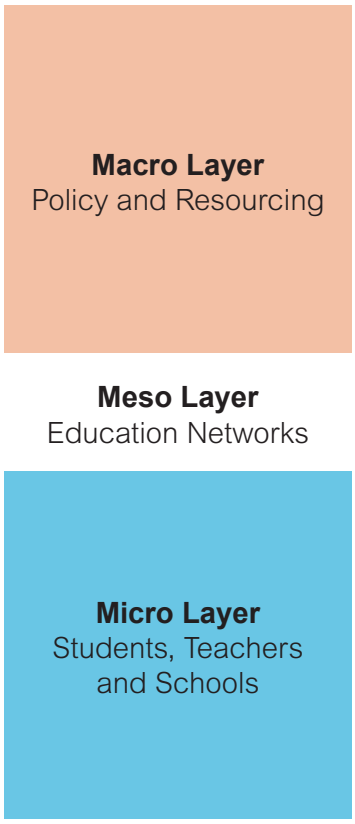
One way to scale deep change is by leveraging the education networks and the "missing middle" layer that sits between policy and classroom practice. Education networks in this missing middle exist in what the OECD defines as the "meso" layer of an education system that lies between the micro level of students, teachers, and schools on the one hand and the macro level of policy and resourcing on the other hand.[67] (See figure 8.) The nature of change required to implement innovative pedagogies means connecting with peers, engaging in dialogue, and exchanging practice and innovations. Naturally, a great deal of teacher learning and development will take place through networking and communities of practice; thus, an important route to leapfrogging will come through the density and dynamism of the meso layer.

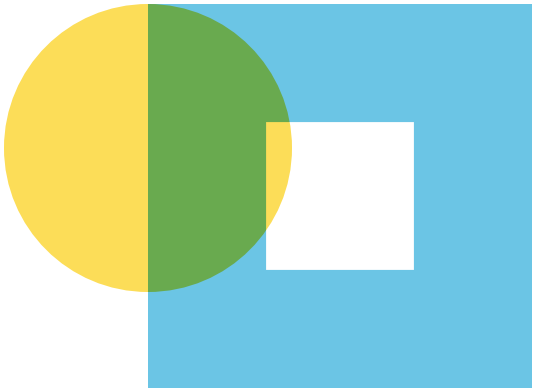
Scaling deep change can be supported through the rise of individual networks, the consistency with which those networks together promote particular trends in pedagogy and teaching, and the density of networking itself. The report explores networks as chains of schools, communities of practice, and teacher networks. Examples of innovations that we studied include Innova Schools, which is a Peruvian chain of low-fee schools based on blended-learning approaches. As the chain tries to reach more students from Peru's lower-middle class, it has put technology at the center of its growth plan for both teachers and students. Innova has developed more than 20,000 scripted lessons for teachers, and student learning is based on a 70–30 model where students spend 70 percent of the day in a traditional classroom, with the other 30 percent in a computer lab where they work individually on their own learning plan and at their own pace.[68]

In addition, the Financially Self-Sufficient Schools, which are organized with lead partner Fundacion Paraguaya, are an international network of secondary schools that support students' education in rural communities. The schools provide low-income students in middle- and low-income countries a quality education with practical agricultural and business skills underpinned through real microenterprises on campus. Classroom learning is paired with hands-on learning through the microenterprises, which generate profit and thus keep the schools low-cost and alleviate the need for government funding or high tuition fees that disadvantage poor families. The concept for the schools began in Paraguay and spread to other countries.[69] Both of the examples represent school chains that have experienced network growth, while adding to the density of school chains around the world.

Figure 8

Leveraging Networks and the Missing Middle





Conclusion

The need to leapfrog to greater heights toward lifelong learning requires innovation in both teaching and education systems more broadly and with explicit attention given to pedagogy. The international community has been much more able to recognize the need for pedagogical change than to address what the pedagogical approaches actually are. This policy brief and our broader report have laid the foundations of what the pedagogical choices are and their key enablers. We have focused on the professional capacity of teachers and the need to develop the foundations for quality teaching, as well as on widening the profile of educators as integral to pedagogical and system transformation. The complexity of the 21st century and the demanding nature of professionalism call for hybrid learning environments and for the scaffolding of coherent educational models and complementary support materials. Transformation demands scaling as deep change in cultures of collaboration. The report argues the pivotal role of the "missing middle," or "meso," level—of networks, chains of schools, and communities of practice—to make this transformation happen.

Ultimately, we call on all of those engaged with delivering education services to children and young people—that is, government decisionmakers, including ministers and heads of teacher training institutes; educators and educator networks and organizations; civil society leaders, including innovators and NGOs; funders and investors, including philanthropists and the international donor community; and the private sector, especially ed-tech companies and innovators—to do the following three things:

1. **Embrace innovative pedagogy as discussed by the six pedagogical clusters of blended learning, computational thinking, experiential learning, embodied learning, multiliteracies, and gamification.**
2. **Make the structural changes of investing in the foundations for quality teaching, widening the educator profile, and appropriately supporting hybrid learning environments.**
3. **Promote networks as one way to scale deep change, which is the type of change required for system transformation.**

We fully acknowledge that our call for action will be difficult to do but well worth it if we are serious about leapfrogging to a new place where all children and young people enjoy a high-quality, future-ready education.

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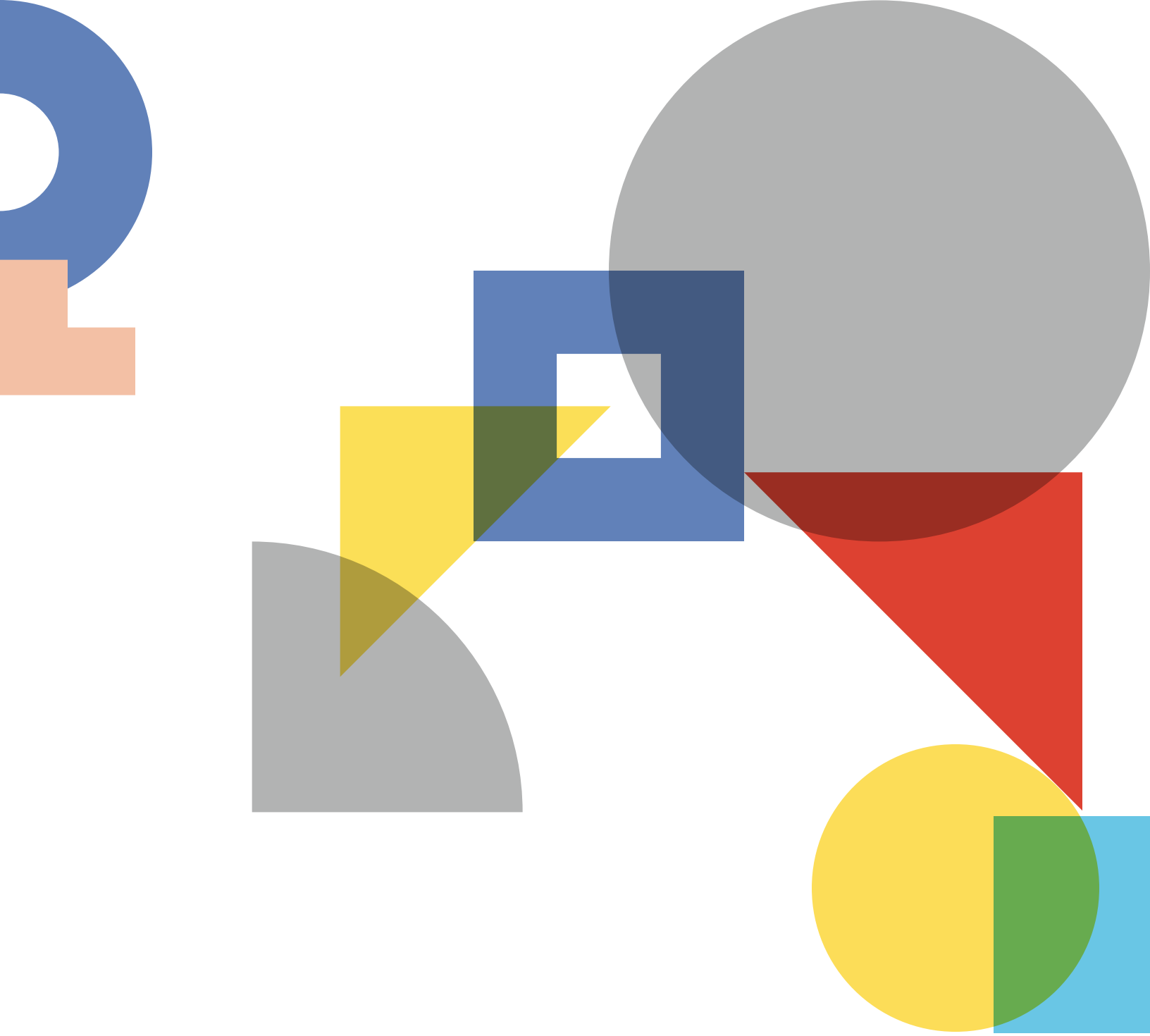

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