

Education In Your Pocket

The case for the smartphone in fast-tracking education reform in developing markets.

The Covid-19 pandemic highlighted both the need for digital education solutions globally and the incredible gaps in access to technology across the world. It highlighted the disparities between the global north and south, but also emphasized significant wealth gaps that occur within countries. The gap in access to resources heightens not only academic achievement discrepancies now, but causes long term harm to learners' futures. Alleviating these gaps, both globally and locally is a key goal of all governments – but the cost and logistical challenges of this task make it incredibly challenging.

Till now, the use of smartphones within the context of K-12 education has been discouraged by both individual educators as well as by government policy. However, the relatively ubiquitous nature of smartphones in middle-income economies, as well as their rapid uptake in low-income economies give Ministries of Education an opportunity to implement mobile-first, digital education solutions using existing infrastructure. This move allows governments to bypass what is generally the largest fixed-cost barrier to digital education solutions, the hardware. In a time of rapid disruption of instruction globally, being able to fast-track education reform using existing infrastructure allows budgets to be spent on pedagogically aligned resources that are more targeted in developing learner capacities. It also ensures that the resources being used will match the digital literacy skills of both educators and learners and ensures their ongoing use.

Digitising Classroom Instruction

The introduction of PCs and the internet into the classroom signifies a revolutionary step in how learners and educators interact with each other and their instructional materials. As the internet has become more and more crucial in our everyday lives, digitising instruction within the education system has become a key focus of curriculum reform. Ministries of Education and NGOs around the world, from School for Life in Croatia to the Plan Ceibal in Uruguay, have implemented new and innovative ways to give all learners access to best in class digital solutions.

The benefits of digital resources are many and varied, from the development of [digital literacy in historically underserved learners](#) through to the deployment of, and access to pedagogically rigorous software that can improve educational [outcomes](#), to the use of big data to give administrators clear guidance on how learners are meeting education [outcomes](#). At a ministry level, digital curriculum reform generally occurs in a two-step process. Step 1 is the procurement and deployment of hardware, followed by the procurement of the associated software. Unfortunately, the significant cost of hardware leaves administrators with significantly curtailed budgets for software, and leads to the purchase of cheap, poor quality education software solutions, or leads to the deferment of obtaining [software solutions](#). This in turn leads to usage of the hardware to falter, and the reform initiatives to be judged a [failure](#).

“This significant difference can be explained by several factors. The first of them is the enthusiasm generated by the novelty. Once the laptops have been assimilated, the lack of planning and prepared activities, of specific contents, of technical and pedagogical support at school gradually reduces the use”

IADB Experimental Assessment of The Program "One Laptop Per Child" in Peru

Managing the Cost of Hardware

In terms of overall budget impact, the general spend on digitisation is [approximately 3%](#) of education expenditure. This puts it near the bottom of education expenditure, after salaries, benefits, and infrastructure. The fixed cost of hardware is generally the largest cost in investing in digital education initiatives, especially when approaching a 1:1 device strategy. Costs at the lowest end hover around \$100 USD per learner, depending on the devices purchased. Add to this the costs of maintenance, support, and internet access, and before long an entire digital education budget has been swallowed up by hardware & network costs. This also does not cover the costs of physical deployment. In regions with large rural areas, the cost of deployment of hardware can be a significant, and more importantly, a [limiting factor](#).

Network infrastructure in schools and in homes is also a significant limiting factor, and if remediation is part of the reform decision, a serious challenge and cost. When [Peru initiated](#) its one laptop one child policy ten years ago, only 1.4% of the target schools had internet access. To build the digital infrastructure needed to ensure fixed-line connections to schools is a multi-year, intensive effort. Even in developed countries such as Australia, there are a significant number of rural schools that don't have access to adequate satellite or fixed-line internet [connections](#), and that is following over a decade of sustained government approach to building a nationwide broadband network. Utilising devices with built-in mobile connectivity can alleviate this issue, especially considering that by 2025 92% of the globe will have coverage to mobile [internet](#). However, this can raise the upfront cost of the device, and also increases the ongoing costs, especially when the cost of mobile data is either expensive or not zero-rated by the telecommunication providers.

Digital Literacy, or the Lack of Digital Literacy

Digital literacy is a key part of education reform. Unfortunately, in most cases, curriculum and implementation specialists focus the majority of their attention on developing the digital literacy of learners and don't ensure that educators are given the requisite professional development needed to successfully implement digital tools into the classroom. Especially in the most disadvantaged regions, this has been shown time and time again to be the [biggest barrier](#) to the successful adoption of digital education reform.

Ensuring that educators have adequate skills not just using the device, but also how to integrate it in the classroom is the single most effective way for education departments to ensure successful digital reform. However, the steep learning curve that utilising a device involves, and then the associated software makes this a very significant investment in professional development. In addition, educators need to learn pedagogically valid approaches to instruction. Once the procurement of software is finalised, a new suite of professional development will need to happen on pedagogy-based software solutions.

The lack of digital literacy in educators however is not reflected in the [uptake of smartphones](#). The high level of smartphones within the population means that educators are generally ready and able to begin using educational software on smartphones. Utilising this existing digital literacy is a key way for Ministries of Education to bypass an existing lack of capabilities in educators, and work on raising them over the medium to long term.

The Rise of the Smartphone

The rise in the smartphone, especially the low-cost smartphone, in conjunction with the spread of 3G, 4G, and now 5G internet access has revolutionized how our society accesses and synthesizes data. It has changed the way we interact with our friends, our family, our colleagues, as well as access entertainment, and news. Already approximately 50% of the global population is using mobile devices to access internet services. In developed markets like North America and Europe, that number is at 75%, but even in developing economies, throughout LATAM, Russia, and China there is a [penetration rate of over 50%](#).

Over the next decade, the number of mobile internet users in developing markets is expected to grow substantially. The global penetration rate is forecast to grow to 60.5%, and importantly, all regions except Sub-Saharan Africa are expected to have an internet penetration rate of over 50%. In Sub-Saharan Africa, mobile internet users are expected to grow from 272 Million users in 2019 to 475 Million Users in 2025, with a penetration rate of 39%. This also hides the fact that in a number of countries in Sub-Saharan Africa, the mobile penetration rate is exceeding 50%, including in South Africa (67.2%) Ghana (55%), Kenya (51.8%) & Côte d'Ivoire (51.3%). The increasing affordability of devices and [internet access in low-income](#) economies combined with a concerted effort from governments globally, there is a strong chance we can meet the UN 2030 Development Goal 9C – Universal Mobile Internet Access.

Bypassing the PC - a Mobile-First Approach to Digital Education

The introduction of smartphones into instruction has been relatively muted especially in the K-12 space. In multiple jurisdictions around the world, smartphones have been [outright banned](#), and in no country has smartphone usage been promoted as a core instructional device. The reasons for this are myriad, from in-class distraction to a lack of educator oversight, to bullying and harassment, to cyber-security. However, these issues are found in all digital resources to some degree and are all concerns that have been raised in the introduction of PCs and tablets previously.

However, just because these are all arguments does not mean they are not valid. The most successful way in combating all these issues in the past has been a combination of education at a parent, student, and teacher level, combined with the normalisation of these instructional methods. In any digital innovation strategy that utilises a mobile-first approach, there must be a concerted effort to ensure all teachers, students, and parents are educated in how to best use the device as part of instruction.

A more critical issue is how to utilise a familial device in the context of the classroom, which is a more structural question in the terms of education. In the traditional teacher-led method of instruction, it is beyond belief that families would ever consider allowing a child to take a smartphone to school, especially if that smartphone is the one device that the family uses to connect to the internet. How then can ministries utilise this existing infrastructure if it's not available at the school? The answer is to transition to a student-led framework for digital resources.

Student-Led Learning

The traditional framework for structured education has been based around a pedagogy of teacher-led instruction. This framework has a number of benefits and pitfalls, but at a high level, this method of instruction lives and dies on the [quality of the instructor](#). It relies heavily on educator specified content and necessarily finishes upon the expected completion of the learning outcome. This raises two crucial concerns regarding how student-led learning can impact educational outcomes, and the issues surrounding teacher quality.

Student-led learning and the related ideas around learning by enquiry allow students to take much more ownership of the educational outcomes. By placing the student at the centre of their education, there is a much greater emphasis on problem-solving and critical-thinking skills, skills that are at the forefront of curriculum reform globally. It also facilitates the development of higher-cognition and meta-cognition skills in students. Skills such as [analysis, synthesis, evaluation](#) as well as [critical thinking, interpretation and self-regulation](#). Meta-cognitive skills include questioning the justification and validity of arguments, not just the given reasons themselves. By facilitating this higher-order thinking, we allow students to build stronger cross-curricula relationships and build the skills needed to fully take part in the modern economy. Studies on students whose instruction included a strong emphasis on student-led learning have shown significantly higher mean scores in testing.

The debate over teacher quality is a perennial issue across almost all countries and is divisive both [politically](#) and [structurally](#). It reflects multiple stakeholders, not just teachers and students, but parents, administrators, unions, and goes to the very heart of a country's culture¹. Any wholesale move to a student-led approach to learning without continuing the traditional teacher-led approach would be resisted. However, this allows administrators to 'thread the needle' by combining the approaches using a mobile-first approach. A move to student-led learning within the context of digital innovation at home, while continuing the traditional teacher-led instruction at school allows ministries to bridge the divide between education traditionalists and reformers, while hopefully bypassing the thorny issues surrounding teacher quality. It allows teachers to access the wealth of data provided by pedagogically sound software to tailor their in-class instruction, while allowing students to build upon skills that they may not get a chance to fully develop within the context of the classroom.

¹The debate over education reform,

Launching a Mobile-First Digital Initiative

Launching a mobile-first initiative allows governments to focus their budget and their efforts on pedagogical, curriculum aligned products first, while slowly building school capacities in the medium to long term. It flips the standard approach to procurement, by utilising existing home infrastructure in the form of familial smartphones to provide a student-led home learning environment. Importantly, it allows governments to fast track the rollout of digital initiatives - ensuring that students aren't left behind in the race to build student outcomes.

The key starting point of a mobile-first initiative is that the focus of the government should be on pedagogy in the form of innovative, curriculum aligned software or 'content' as opposed to the purchase of expensive hardware. It leverages existing hardware mobile-internet devices to provide student-led learning opportunities at home, and feeding the data into in class instruction.

The goal for Departments of Education is to effectively utilise budgets to boost digital transformation and importantly increase academic outcomes. With limited budgets, and often, limited experience with software based education solutions, this can often be daunting for both administrators and educators. It doesn't have to be this way. Utilising a combination of government and private sector initiatives in the rollout can ensure large scale adoption and impact.

The Key Needs for a Mobile-First, Digital Education Initiative

1. Great Software

Curriculum-aligned, pedagogically rigorous, engaging software is fundamental when launching a student-led approach to education. Without a strong pedagogical foundation, the impact of any software will be limited. Without a strong engagement factor, the product won't be used in a student-led approach. The user experience for all stakeholders needs to be understood. In addition to the students, parents, teachers, and administrators should all ideally have access to the software, to ensure full stakeholder engagement. More than that, it's important to identify the key technicalities needed. An understanding of app availability, language availability, accessibility options, size, and connectivity needs all require consideration when evaluating software for education.

2. Third-Party Engagement

Engaging with third parties will improve the implementation of a software solution in areas of limited technology. Governments should strive to come to agreements with telecommunication providers to ensure zero-rating of the software and engage with library networks and internet cafe networks. This will help ensure widespread access within the community. Plus, teacher/education associations must be included to ensure messaging. Third-party engagement is key to achieve widespread adoption.

3. Clear Goals and KPIs

It's fundamental that there are clear, realistic, goals for any implementation of a digital solution that are continuously reviewed and held up to scrutiny. These can be built around efficacy, engagement, adoption, or any other government priorities. But whatever the goals are, it's important to hold the solution up to scrutiny. One of the key benefits of a software-first approach is that providers are incredibly agile, with an ability to continuously refine their implementation approach as they go about it. With hardware, once it's out in the wild, it can be very difficult for the manufacturer or the distributor to change their approach. By working closely with the software solution provider, governments can ensure that their priorities are continuously being met, and if not, can arrange for the approach to be changed so goals are achieved.

How to get started

Large scale digital transformation is difficult, but there's a clear understanding that it is a fundamental part of how education is going to be delivered in the 21st century. A software-first, student-led approach can help with the first steps of this transformation. Its impact on budget is many times smaller than a hardware first approach, and licensing models allow governments to only spend on what they need. It also ensures that educational outcomes are the key goal of the solution.

Matific has successfully worked with Ministries of Education across the globe on software implementations with various levels of digital infrastructure. From countries as diverse as Ukraine, the UAE, and Peru, and Ghana, Matific has been able to implement Matific at scale, using both in-school infrastructures as well as familial devices to attain adoption at scale.

If you'd like to discuss how we can work together to improved educational outcomes, contact us at start@matific.com.