Blended Beyond Borders: A scan of blended learning obstacles and opportunities in Brazil, Malaysia, & South Africa

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Foreword

Early on, technology was introduced to help districts or regions with struggling, low quality schools, or to supplement schooling. But despite the 'wow-factor', the tech-rich environment alone is not blended learning. Now, as online instruction models are embraced by more schools, teachers must shift to a 'new choreography of interaction' with tech.

Even before technology came to school, enlightened educators were natural disrupters. Beyond simply welcoming technology, they were the leaders who pressed systems to take the next step in the dance: integrating online learning curricula with re-forged, focused teaching practice. The emergence of this 'blended learning' might be considered among the earliest and most impactful drivers of disruption in our technology era. But the shift in priorities it sparked in pedagogy and curriculum has yet to produce a process for sustained and effective teacher development.

The WISE Report from the Clayton Christensen Institute explores perspectives on the blended learning process through the institute's comprehensive surveys of the three countries. They ask essential questions that speak to the heart of the action in blended learning, and which all educators should pose continually among their community of collaborators. Are the students engaged in true blended learning, and to what extent? How exactly are they benefiting? Are the teachers integrating online learning into the curriculum meaningfully? Are they receiving the right targeted training?

Among the particular values of the report are insights revealed about dynamics within a school and among teacher communities. In unique examples, we witness the isolation of early adopters of technology whose colleagues resist. The authors suggest forming collegial networks of teachers in other schools to build solidarity and support. We see how degrees of centralization and funding affect rates of innovation growth across diverse environments.

While the authors acknowledge that low response rates and other constraints limit clear comparisons across all three countries, the process produced valuable learnings and establishes priorities for exploration. The report begins with a useful frame for understanding disruptive technology. It gives educators strategies to integrate technology into new classroom instructional models in more systematic and focused ways. The authors call for more professional development on teaching in new tech environments, not just discrete trainings on the latest apps. As a productive disrupter, blended learning is transforming teacher-student relationships. This report, with a full critique of the survey process, and detailed appendices, is a valuable framework for exploring what school communities are gaining as they develop and use blended learning models.

Stavros N. Yiannouka
CEO
WISE

Executive Summary

Over the past two decades, technology use in schools has surged worldwide. However, how exactly the rise in technology correlates with fundamental shifts in teaching, learning, and student outcomes remains an open question.

Although this report touches on a number of school-based efforts to implement edtech, we focus on a particular use of technology: analyzing whether, and how, a sample of brick-and-mortar schools in three countries use online learning to deliver content in new, more flexible ways.

For the past decade, the Clayton Christensen Institute has studied how brick-and-mortar schools can effectively integrate technology to shift instruction to better differentiate students' needs—a shift that we call blended learning. Although technology can contribute to an array of school-based practices, online and blended learning programs represent one of the most profound opportunities to not merely arm students with devices or schools with Wifi, but to shift industrial-era instructional models that are ill-equipped to reach each and every student in a differentiated, customized manner. For this to occur, we need to track when and how technology integration efforts are, or are not, actually bringing about instructional model change.

Along with partners in Brazil, Malaysia, and South Africa, we distributed our online survey across samples of schools. We share and analyze data from 110 survey respondents in Brazil, 119 in Malaysia, and 34 in South Africa, along with 13-15 case studies of specific school models.

The sampling methods that we drew from were at once too diverse and too constrained to each context to make broad conclusions in a consistent manner across these distinct geographies. Therefore, we do not intend for readers to directly compare the data sets among Brazil, Malaysia, and South Africa. Rather, each survey provides insights into some of the technology opportunities and challenges emerging in each country, specific to the sample of schools and educators we were able to reach through our survey partners. For future efforts to bolster the reach, reliability, and comparability of such surveys, we recommend how the survey instrument might be refined and deployed in a manner to make consistent, reliable regional, countrywide and inter-country conclusions about blended-learning implementation rates, opportunities and challenges.

Without directly comparing the samples, it is worth noting a few common themes that emerged across all three.

- **First, the need to clearly distinguish between tech-rich versus blended-learning models arose across all three samples.** In tech-rich models, technology may be present, but content is not being delivered online. Illuminating when technology is and is not being used to provide instruction could prove crucial to helping countries, states, schools, and vendors more deliberately leverage technology investments to shift instruction. Clarifying distinction between tech-rich and blended models might also begin to streamline and pool demand that could drive up the supply of edtech—particularly curriculum and content tools—that could begin to support more and diverse blended-learning models that align to national languages and curriculum.
- **Second, innovations in online and blended learning tend grow differently in different circumstances, depending on the success metrics to which they are held.** In at least two of the countries, namely South Africa and Malaysia, the degree of national centralization, of both curriculum and tools, clearly affects how blended learning stands to grow in particular geographies. Centralized models offer both upsides and downsides when considering how to spur and scale innovation generally, and blended learning in particular. Looking ahead, metrics driving technology integration will need to move beyond access to, or usage of, technology to measuring the learning outcomes technology integration efforts are aiming to produce.
- **Third, infrastructure and human capital pose some of the greatest challenges to implementing technology in general, and blended learning in particular.** Across all three surveys, connectivity, infrastructure, and educator professional development ranked among the greatest challenges reported to implementing technology in schools. These results suggest that connectivity and teacher support are major areas for countrywide investment to support blended-learning innovation. Absent major infrastructure overhauls or human capital investments, these findings also highlight the importance of not overstating education technology's potential, absent the logistical and human factors that need to be in place to realize that potential.

We are witnessing the rise of technology-enabled instructional models that offer the chance to scale access to learning at a rate and manner historically out of reach. Tracking and analyzing if, and how, schools are making this shift is a crucial first step toward ensuring that rising investments in education technology are translating into greater access and success in learning.

Acronyms & Abbreviations

CAPS: Curriculum Assessment Policy Statements
DBE: Department of Basic Education
Frog VLE: Frog Virtual Learning Environment
GDP: Gross Domestic Product
ICT: Information and Communications Technologies
The Institute: Clayton Christensen Institute
JET: JET Education Services
KPI: Key Performance Indicator
OECD: Organisation for Economic Co-operation and Development
PISA: Programme for International Student Assessment
PLC: Professional Learning Community
USAID: United States Agency for International Development
USD: United States Dollar

Introduction

Over the past two decades, technology use in schools has surged worldwide. In 2012, the global edtech market, which includes both K–12 and higher education, was estimated to be worth $90.9 billion (USD) (IBIS Capital, 2013), and a 2016 report by IBIS Capital projected that number to more than double to $252 billion (USD) by 2020 (IBIS Capital, 2016).

Crucially, not all edtech efforts are created equal. These growing investments in infrastructure, hardware, and software reflect various visions for the role of technology in education. These differences hinge on both the resources that school systems have at their disposal, and the student learning outcomes that educators hope technology will support.

Schools, in other words, deploy edtech in a variety of circumstances and to varying degrees of success. Some educators and administrators use tech-enabled platforms and dashboards to organize student work and data. Others use online tools to streamline how they administer assessments. Some offer technology to open up internet research opportunities to their students. Still others manage online curriculum on laptops or mobile devices. Others use technology not merely to deliver content, but also to personalize a student's learning experience by providing differentiated learning experiences to individual students within a single class session.

Although this study touches on a number of such efforts, we focus on a particular use of technology: analyzing whether, and how, a sample of brick-and-mortar schools in three countries use online learning to deliver content in new, more flexible ways.

In the United States and beyond, schools often use a rote, one-size-fits-all approach to delivering instruction. In this model, traditionally structured education programs tend to focus strictly on face-to-face, teacher-centered instruction (including teacher-led discussions); match students by age, and possibly also ability; and use instructional materials based on textbooks, lectures, and individual written assignments. All students in the classroom generally receive a single, unified curriculum. Subjects are often individual and independent instead of integrated and interdisciplinary, particularly in secondary school.

These structures can, in turn, erect barriers to each individual student accessing and mastering material in a manner that best suits factors that contribute to learning, such as his particular needs, strengths, background knowledge, and working memory capacity.

Although technology is no silver bullet to tackle these barriers, it may hold the promise of creating school models that better tailor instruction to each student and that unlock access to learning otherwise out of reach. For nearly a decade, the Clayton Christensen Institute has studied how brick-and-mortar schools can effectively integrate online learning to shift instruction to better differentiate and customize to students needs—a shift that we call blended learning. We hypothesize that as technology investments continue to grow,

focusing these investments in blended learning will be a powerful driver for educating more students to new heights during the twenty-first century. Tracking and analyzing if, and how, schools are making this shift is a crucial first step toward ensuring that massive and rising investments in education technology are translating into greater access and success in learning.

What is Blended Learning?

Blended learning is a formal education program in which a student learns, at least in part, through online learning with some element of student control over time, place, path, and/or pace and at least in part, at a supervised brick-and-mortar location away from home. The modalities along a student's learning path are connected to provide an integrated learning experience, which may mean using data from online learning to inform and drive a student's offline learning (Horn and Staker, 2015).

Blended learning emerged from a disruptive force in education: *online learning*. We define online learning as instructional content that is delivered online with some element of student control over time, place, path, and/or pace (Staker and Horn, 2012). The term online learning is often synonymous with digital learning, e-learning and virtual learning.

What makes online learning disruptive? Disruptive innovation describes the process by which technology enables new entrants to provide goods and services that are less expensive and more accessible, and eventually replace—or "disrupt"—well-established competitors. A successful disruptive innovation contains three ingredients:

1. Enabling technology — an invention or innovation that makes a product more affordable and accessible to a wider population.

2. Innovative business model — a business model that targets nonconsumers (new customers who previously did not buy products or services in a given market) or low-end consumers (the least profitable customers). This is most easily accomplished by new entrants since they are not locked into existing business models.

3. Coherent value network — a value network in which upstream and downstream suppliers, partners, distributors, and customers are each better off when the disruptive technology prospers.

The evolution of the computer industry provides a clear example of disruptive innovation at play. Apple's earliest PCs were quite rudimentary compared to the expensive and sophisticated mainframe and minicomputers that

dominated the 1960s and 70s. But Apple's original PC customers were not demanding professionals looking for powerful machines. Instead, Apple marketed the PC to nonconsumers—hobbyists and children who were delighted that they could afford a contraption that they could tinker with and use for basic word processing and computing. Over time, Apple then shepherded the PC up market—improving its technology to eventually serve the needs of more and more demanding customers, offering higher processing speeds and storage volume, and pulling those customers away from mainframe and minicomputer competitors with a lower cost offering.

In a similar vein, online learning stands to offer a solution that is more affordable and accessible than many traditional schools are able to offer through strictly teacher-led instruction. Online learning as a modality can also provide students with greater access and flexibility over when and how they learn than can highly centralized, teacher-led lectures that have dominated many schools for centuries. Also, like all disruptive forces, many online learning programs got their start by offering a product and service where the alternative was nothing at all. For example, in the United States, early online courseware offered advanced courses in school systems that were unable to offer those same courses face-to-face. Rather than trying to compete head-on with traditional teacher-led instruction, these courses competed with circumstances of nonconsumption when students were unable to access learning, and schools were unable, due to limited resources, to offer it.

As the Institute tracked the disruptive growth of online learning across the U.S., we started to notice a pattern: although online learning can technically occur anytime, anywhere (depending on a student's access to hardware, software and connectivity), online courses were not wholly displacing school as we know it. Rather, brick-and-mortar schools, at least in the United States, remained a mainstay of communities.[1] Still, online courses and learning modules continued to penetrate schools, in turn disrupting traditional teacher-led, whole-class modes of instruction. It is this fundamental pattern—the continued presence of brick-and-mortar schools and institutions, alongside the rapid growth of online learning—that describes the basic tenets of blended learning.

This does not mean that blended models do away with teachers or teacher-led lectures, small-group lessons, or one-on-one face-to-face instruction. Rather, blended models offer up a new choreography in classrooms and schools whereby students may interact with both content and teachers in new ways.

As a direct outgrowth of online learning, blended learning does not describe any classroom in which technology is merely present. Oftentimes, schools may fill classrooms with computers or use a range of online productivity tools (such as email or online document management tools), or use hardware tools like projectors to stream online media or textbooks to a classroom of students.

1. Although the resilience of brick-and-mortar schools reflects a range of factors, we largely attribute this pattern to American parents and families still continuing to demand both the custodial (child care) and social (interacting with other similarly aged students) roles that schools play. As further evidence of this, in the U.S., online learning has rapidly outpaced the growth of homeschooling. For the purposes of this study, we surveyed teachers and leaders in brick-and-mortar schools. This means that in turn, we were exclusively capturing the popularity and nature of blended (rather than fully online, or virtual) models in each country. Further studies to understand the growth of online and blended learning on a country-by-country basis would be wise to capture what percentage of students are attending brick-and-mortar institutions to gauge the potential breakdown of fully-online versus blended models.

These uses of technology, according to our definition, do not constitute blended learning. Rather, they constitute *tech-rich models*. Tech-rich models do not offer instruction through online delivery with some element of student control over time, place, path, and/or pace. Instead, tech-rich models tend to preserve teacher-led instruction. In tech-rich models, teachers and students use technology tools, but in the absence of students directly receiving content online. The litmus test, then, for blended learning, is whether students are receiving some instruction online—not, that technology is merely present in a given classroom.

This does not mean, however, that all blended-learning models look the same. Beginning in 2011, the Christensen Institute began profiling U.S. organizations that had blended, or planned to blend, online learning into their brick-and-mortar schools. This led to the creation of a taxonomy of U.S. blended-learning models that included four general patterns of blended-learning with flexible definitions. These models are described in detail in *Appendix A*.

Since the publication of these model definitions, the Christensen Institute has done extensive research in U.S. schools based on these different blended-learning models and their outcomes.[2] However, we understand that the viability and evolution of these models, although flexible, are rooted in an American context: they are shaped by U.S. national and state education policies and structures, the technology market that has arisen to serve those needs, and the philosophies that undergird traditional American education. In order to more thoroughly explore the potential innovations brought about through blended learning, this study marks our first effort to collect examples and data on how blended learning looks outside of our borders, where countries face different challenges and opportunities to harness the power of technology to forward new instructional models.

International Scans of Educational Technology & Blended Learning

Although this marks the Christensen Institute's first multi-country study of blended learning models in primary and secondary schools beyond the U.S., it is surely not the first study to explore the topic of technology or online learning in education globally.[3] A range of year-over-year global surveys has tracked the use of educational information and communications technologies (ICTs) in schools and classrooms. For example, a 2003 study by SRI International catalogued 174 educational technology efforts around the world (Kozma, 2003). These case studies featured innovative classroom practices from 28 participating countries. Researchers found that most of these practices highlighted student activities such as searching for information, designing

2. See for example Mackey & Watson (2015). For a broader sample, please visit our Blended Learning Universe which profiles over 500 blended-learning schools and school systems worldwide: www.blendedlearning.org/directory.

3. Although we did not undergo a comprehensive, global literature review, we suggest that further investments support non-western research initiatives on topics around technology in education.

products, and publishing results. Teachers also reported using technology to create structure, provide advice, and monitor progress. Few participants reported actually using technology to deliver content, as would indicate that blended learning was present.

In 2006, the International Association for K-12 Online Learning (iNACOL) conducted an international survey of practices, policies and trends in online learning in primary and secondary education, which provided a snapshot of how numerous countries were advancing K-12 online education (Powell and Patrick, 2006). iNACOL conducted a similar survey across 60 countries in 2011, which included questions on both blended and online learning practice and policy. The 2011 survey reported that across 54 countries surveyed, blended learning—occurring at least in part in brick-and-mortar schools—was being implemented with much greater frequency than online learning (Barbour et al., 2011).

Another 2011 survey of 22 countries spearheaded by the U.S. Department of Education looked at a wide range of variables shaping the use of ICTs, as articulated through countrywide technology plans (U.S. Department of Education, Office of Educational Technology, 2011). Researchers found that only seven of those 22 countries had initiatives in place to spur the adoption of online instruction. And although 18 of 21 countries expressed *interest* in using ICTs to provide learning opportunities "tailored to students' individual needs and styles," only 13 countries reported having any such programs in place.

Other multi-country surveys also suggest that widespread ICT efforts often constitute investments in tech-rich models or infrastructure efforts rather than in actual online- or blended-learning efforts. In a 2015 study of teaching practices in European schools, just over 60 percent of participants from 17 countries noted that students used computers at least monthly to develop skills and strategies; but that over 80 percent of students were instructed by their teachers to use computers to "look up information" at least once per month. And on average, about half of students were found to be in classrooms where computer software was used as a supplement, not a basis, for instruction in all subjects (Isac, et al., 2015).

Findings like these largely reflect a propensity in the past to deploy technology in schools for administrative, non-instructional, or supplemental purposes. It is hardly surprising, then, that the student learning outcomes correlated with education technology initiatives remain weak at best. According to a recent study by the Organization for Economic Co-operation and Development (OECD), the relationship between schools providing access to and using computers in classrooms has little bearing on student outcomes, as measured by the Programme for International Assessment (PISA) test (OECD, 2015). As the report's authors conclude, "the connections among students, computers, and learning are neither simple nor hardwired; and the real contributions ICT can make to teaching and learning have yet to be fully realized and exploited."

We agree. But looking ahead, we hope that surveys like this can begin to arm leaders and educators with information and strategies to deliberately integrate technology into new instructional models. In the report's conclusion, we address opportunities for further research to continue to monitor and analyze the relationship between technology implementation, blended learning, and student learning outcomes on a global scale.

Research Goals & Methodology

The goals of this research project were threefold. First, we aimed to present a snapshot of blended-learning efforts in three countries, with data and analysis based on a survey and subsequent school visits and case studies.

Second, we conducted this research with the overarching goal of creating a shareable research model and survey instrument suited to gathering local, regional, or countrywide data on emerging blended-learning models that other researchers, policymakers, and practitioners can use in their own contexts. This survey instrument is included in *Appendix B*, and described in greater detail below.

Third, we aimed to discover and outline the potential opportunities and challenges that school systems face when implementing blended learning in various contexts, in order to recommend strategies that can help pave the way for effective blended-learning innovation internationally.

We selected three countries in which to conduct our survey: Brazil, Malaysia, and South Africa. We chose these three countries for their geographic and cultural diversity, and because they represent a spectrum of highly centralized (Malaysia) to far less centralized (Brazil) national education systems. We also had existing contacts with various education organizations interested in technology and innovation in each country. Given the logistical and cultural barriers of conducting research abroad, we anticipated that such partnerships would prove to be a reliable conduit to collecting more and better data on school-level blended-learning efforts.

In order to identify blended-learning trends in these three countries, the Institute administered an online survey to schools through these partner institutions via email and social media channels. By partnering with a range of intermediaries in each country, we aimed to ensure that the survey reached teachers and school leaders in a diversity of settings, including rural, suburban, and urban schools.[4] In some countries, this also included a mix of public and private schools. The data collected in these surveys quantified a number of self-reported items, including but not limited to: an exploration into the extent to which respondents were implementing online and blended-learning programs,

4. A very similar survey instrument deployed in our previous U.S.-based research report, "State of Opportunity: The status and direction of blended learning in Ohio", (Arnett, Benson, Bridges, Bushko, Duty, and Mohammed, 2015) as well as the school profiles in the Christensen Institute's Blended Learning Universe Directory (blendedlearning.org/directory) acted as templates for this survey work. See Appendix B for a copy of the survey instrument.

the particular tools respondents were using within their models, and challenges respondents faced in implementing technology in their classrooms and schools.

We initially piloted the survey instrument with three to five schools in each country and asked for feedback from the respondents on the ease of completion and language used to describe blended approaches. Based on this feedback, we adjusted the survey slightly to create a better experience for respondents in each country.

Unfortunately, however, we had very low response rates to this online survey across all three settings. In light of this, we would urge future researchers to spend additional time upfront gauging respondent incentives, local and national partnerships, and how best to frame the survey outreach in order to increase survey response rates.

Given the low response rates to our online survey, we caution the reader from interpreting these statistics as representative of the whole of blended-learning activity in each country. Rather, our data better reflects the experiences of a subset of schools on their blended journey.

To address this small quantitative sample size, we also conducted qualitative case studies in a smaller number (13-15) of schools in each country to collect more detailed data. Using survey responses, as well as suggestions from our in-country partners, we contacted a small number of schools for a more in-depth interview and observation process. We selected these schools based on their reported integration of technology in teaching and learning, as well as their geographic diversity. Through school site visits and interviews, we were able to more fully understand how a subset of blended-learning efforts came about, and the effects blended programs have had on students and teachers in each environment. Additionally, through a range of visits to schools that were using technology but had not pursued blended-learning models, we identified a range of roadblocks preventing schools from going blended.

Lastly, we then analyzed the combined survey data and additional qualitative case study data together in light of our previous blended-learning research and the specific policy landscape in each country, in an effort to explain emerging trends.

Due to the varying partnership models that we forged across the three countries, we do not intend for readers to directly compare the data sets among Brazil, Malaysia, and South Africa. Instead, in the report's conclusion, we offer key themes across all three countries, and suggest how schools, education officials, and policymakers might continue to push blended-learning innovations forward in the future.

Our hope is that the survey data collected from educators and leaders can contribute to the ongoing conversation about bringing technology to bear more reliably and more widely in schools' instructional models.

Country Analyses

Brazil

Basic education at a glance

157,381 public schools

37,551 private schools (Bunge Foundation, 2012)

50,042,448 students (Ministry, 2014)

357,418 teachers (INEP, 2011)

Average student to teacher ratio is 21:1 (The World Bank, 2014)

16.5% of students are in private school populations (Ministry, 2014)

13% of population has attained tertiary education (de Moraes, 2014)

Brazil's modern education system grew out of countrywide reform efforts in the late 1980s. The federal constitution of 1988 created a far more decentralized and universalized system of education than existed previously. According to researchers, the 1988 constitution "emphasized universal rights-based welfare, democratization, professionalization of public management, creation of municipal public services, and federal cooperation to reduce regional inequalities" (Pierce, 2013).

Since then, Brazil's spending on education has been relatively high compared to other similar countries, with approximately 4.4 percent of the GDP devoted to primary education (Plano CDE & Omidyar Network, 2017). Average student performance, however, is significantly below the OECD average in science (401 points, compared to the average of 493 points), reading (407 points, compared to the average of 493 points) and mathematics (377 points, compared to the average of 490 points), with long-standing gaps in outcomes between rich and poor students (OECD, 2016). Recent PISA scores also indicate that there is a widening achievement gap across math, science and reading (OECD, 2016). Inequality in achievement also falls disproportionately along racial lines (Senkevics, 2012). For example, the average performance of Afro-Brazilian students is consistently lower than that of their non-Afro-Brazilian peers (Paixão, Carvano, & Rossetto, 2010).

The Brazilian education system faces numerous hurdles to closing these gaps and improving overall student outcomes. Acute human capital shortages have made it difficult to attract and retain teachers. For example, at the primary level, there is a shortage of an estimated 300,000 teachers (Hall, 2014). Time is also a limiting factor in schools. The average school day in public schools lasts about four hours, and instructional time typically is closer to an estimated three hours per day (Plano CDE & Omidyar Network, 2017). Parents choose to enroll their student in either morning, afternoon, or evening classes; many schools do not offer whole-day options for students due to high maintenance costs and limited physical space (Plano CDE & Omidyar Network, 2017).

Rural students and families have historically faced additional challenges to accessing primary and secondary education, although attendance and completion rates have shown improvements in recent years (UNESCO, 2015). Fortunately, distance and online-learning models are starting to bring more educational choices within reach for more rural students. For example, in the Amazon region of Brazil, the Amazonas State Secretariat of Education established thousands of local government classrooms where small groups of students receive teacher-led instruction via live-streamed video (Perlman-Robinson, Winthrop, & McGivney, 2016).

Consistent with these efforts, countrywide, Brazilian schools' ICT penetration in schools has increased over the past decade. One of the most comprehensive data sets on education ICT efforts consists of data from 2009-2012 surveys conducted by the Center of Studies on Information and Communication Technologies (CETIC). These surveys provide an overview of device and connectivity rates across students' homes and schools.[5] Researchers found that students were more likely to use technology at home than at school, and that private school students were far more likely to encounter technology in schools than their public school counterparts (Comitê Gestor da Internet no Brasil, 2014).

To date, technology penetration in schools overall, however, remains low. According to a 2017 report by the Omidyar Network and Plano CDE, which analyzed technology use among low- to moderate-income (LMI) families in particular, 77 percent of public high school LMI students report not using computers at all in their classrooms, roughly 75 percent report not being able to access specific educational websites outside of the classroom, 80 percent report not being able to access educational videos, and 95 percent report not being able to access online courses (Plano CDE & Omidyar Network, 2017). Despite these shortcomings, the researchers expressed hope that technology might still play a larger role in teaching and learning in years to come. Of note, for example, the vast majority of students surveyed reported having access to the internet through mobile devices (Plano CDE & Omidyar Network, 2017).

Partnerships and Survey Methodology

In order to distribute our survey to educators and school administrators, we partnered with five institutions that have strong ties with practitioners in Brazil: Lemann Foundation (Fundação Lemann)[6], Peninsula Institute (Instituto Península)[7], Nova Escola[8], Porvir[9], and Todos Pela Educação.[10] These five partner institutions shared our survey link on their social media pages: five Facebook pages and one Twitter account. Combined, these social

5. Notably, this survey excludes rural schools due to logistical and cost barriers. Therefore, the data reported likely overstates technology penetration countrywide.

6. Lemann Foundation is a nonprofit that seeks to positively impact the Brazilian education system by creating a network of talented leaders in the field.

7. Peninsula Institute is a nonprofit that works in the areas of education and sport to catalyze the sustainable development of society through transformation and empowerment.

8. Nova Escola is a nonprofit that aims to transform Brazilian education through high-quality content and services for teachers and administrators around the country. Its digital magazines have been read by millions of educators.

9. Porvir is a nonprofit that uses communication and social mobilization to map, produce, and disseminate content on innovation in education. «Porvir's goal is to inspire the creation of education policies, programs and investments.»

10. Todos Pela Educação is a nonprofit whose mission is to engage Brazilian society in order to bring quality education to children around Brazil.

media channels reach up to an estimated 1.9 million followers throughout the country, although we do not have direct access to statistics on the social media reach of the posts in particular.[11]

A number of factors shaped our sample in Brazil. First, most of our partner institutions focus on innovation and technology in education. Therefore, we expect that the audience of educators and leaders that the survey reached skewed heavily towards those in the country who are already inclined toward innovation and technology. We thus assume that this sample will show a greater rate of technology use than a random sample of educators would have. Second, because we shared the survey link on social media pages, we only have responses from people who already have some access to the internet and technology. Therefore, this dataset will exclude those who do not use social media for educational purposes, as well as those who do not have reliable internet access.

We received a total of 183 completed responses to our survey. Another 267 additional responses were started, but not completed.[12] Out of the 183 completed responses, 117 responses came from people affiliated with primary or secondary schools, while the remainder came from postsecondary institutions. Finally, at the beginning of the survey we asked respondents, "Do you/Does your school use online learning in some way? Meaning, some or all of the instruction takes place using internet connected hardware/software?" Out of the 117 total responses, seven noted that their school did not use online learning. We have controlled the data below by including data only from respondents who affirmed that their school uses online learning in some way. In other words, the graphs below summarize the data from 110 completed, basic (K-12) education responses that are using technology in their school.

From these 110 survey respondents, we contacted 31 schools for potential visits among a geographically diverse sample. From this list, we visited 12 schools in person. The majority of these were private schools (ten), located in the north (one), the northeast (two), the south (three), and the southeast (six) of Brazil; the only region we were unable to visit was the center-west due to time and cost limitations. We also contacted teachers and administrators via Skype from three additional schools: one of which completed the survey,[13] and the other two were referred to us by a partner organization. These two non-survey respondents were already familiar with blended learning and implementing programs in their schools. They did not take the survey and their answers are not reflected in the data below. In total, seven of these 15 schools were

11. Each post used slightly different language, but all invited followers to participate in our survey for a chance to win a copy of Blended: Using Disruptive Innovation to Improve Schools. Each partner posted the survey twice—first in the weeks of February 13-24, then in the weeks of March 13-24. We closed the online survey instrument and downloaded a full dataset on May 3.

12. A number of factors may have contributed to this large amount of incomplete survey responses. First, most of these "incompletes" had not even one question answered, meaning that users opened the survey but chose not to continue after the first page. This may be due to the fact that the first page had a lengthy text describing the intention of the survey and respondent rights; this may have been off-putting to the user and deterred them from continuing. Second, all questions besides the free response were required, which may have persuaded the user to close the survey rather than input personal information or choose answers from a long list (e.g. subject areas). Third, although we determined that our survey could be taken in five to seven minutes (based on our survey tool's estimation), this may not have been an accurate estimate and instead brought on fatigue, which prompted the user to quit the survey. We plan to take these precautions in future surveys and suggest that other researchers using the instrument pilot the survey with specific attention to these issues and take steps to remedy them if these hypotheses are found to be true.

13. We had initially arranged to visit this school in-person; however, due to a worker's strike throughout the country on the planned day, we were unable to conduct classroom observations.

implementing blended learning. The remaining were tech-rich models that incorporate technology but have not evolved to delivering content online and using those experiences to inform offline, face-to-face teaching and learning. Profiles of those seven schools can be found in *Appendix C*.

Data Summary

Tell us about yourself and your school

Respondents represented a range of different school types, as shown above. These schools came from 19 of 27 federative units (26 states and one federal district).

Figure 1.1: Map of survey respondents in Brazil

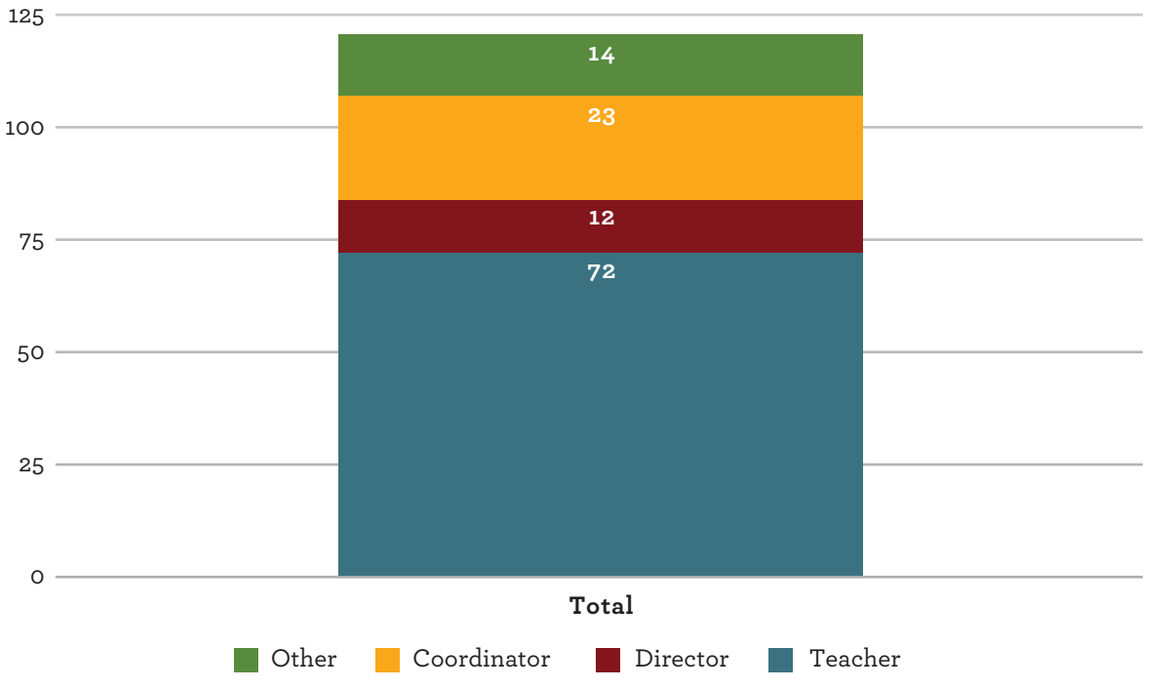

Figure 1.2: Respondent job titles

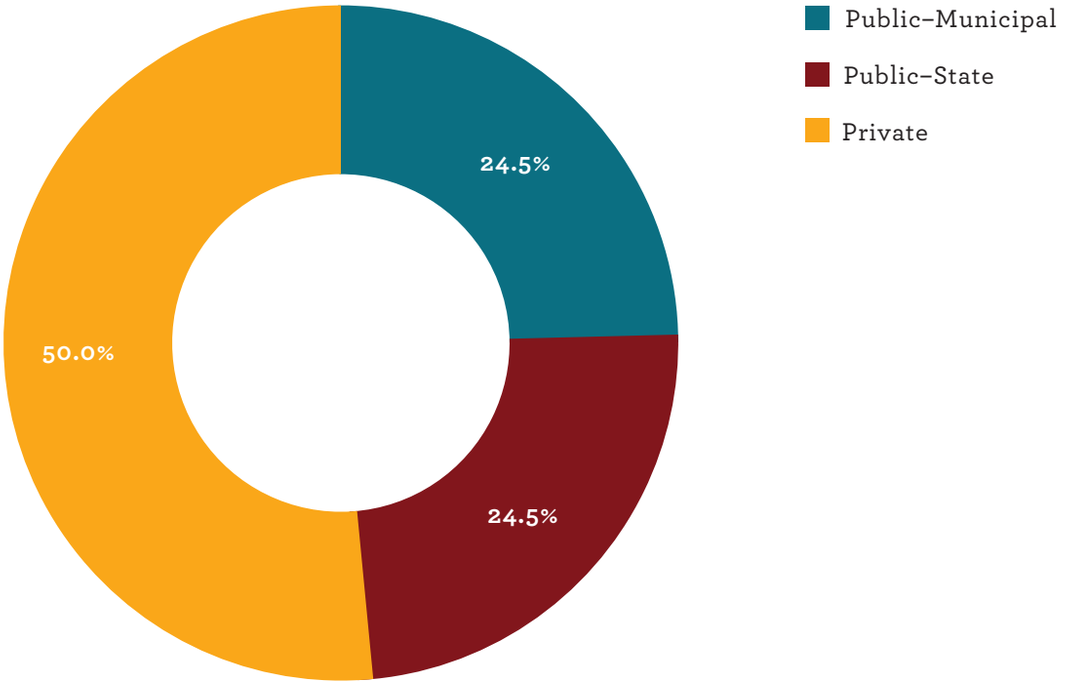

Figure 1.3: School types

How are you using technology?

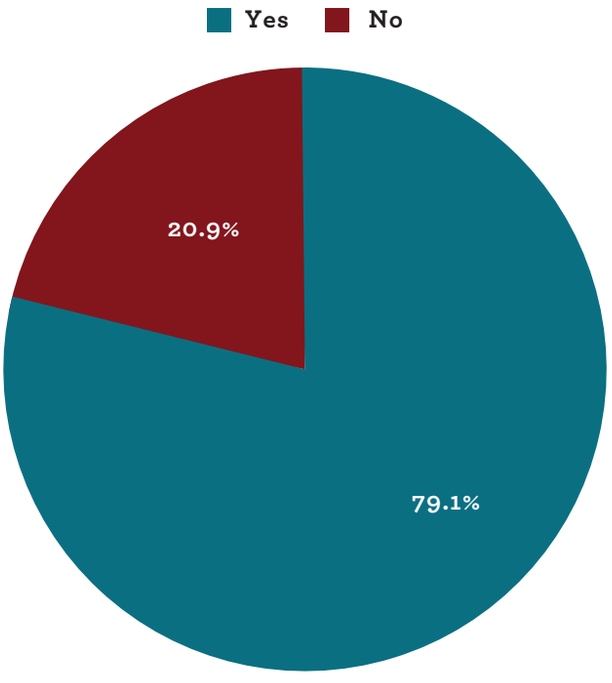

Figure 1.4: Are online and offline activities connected in some way?

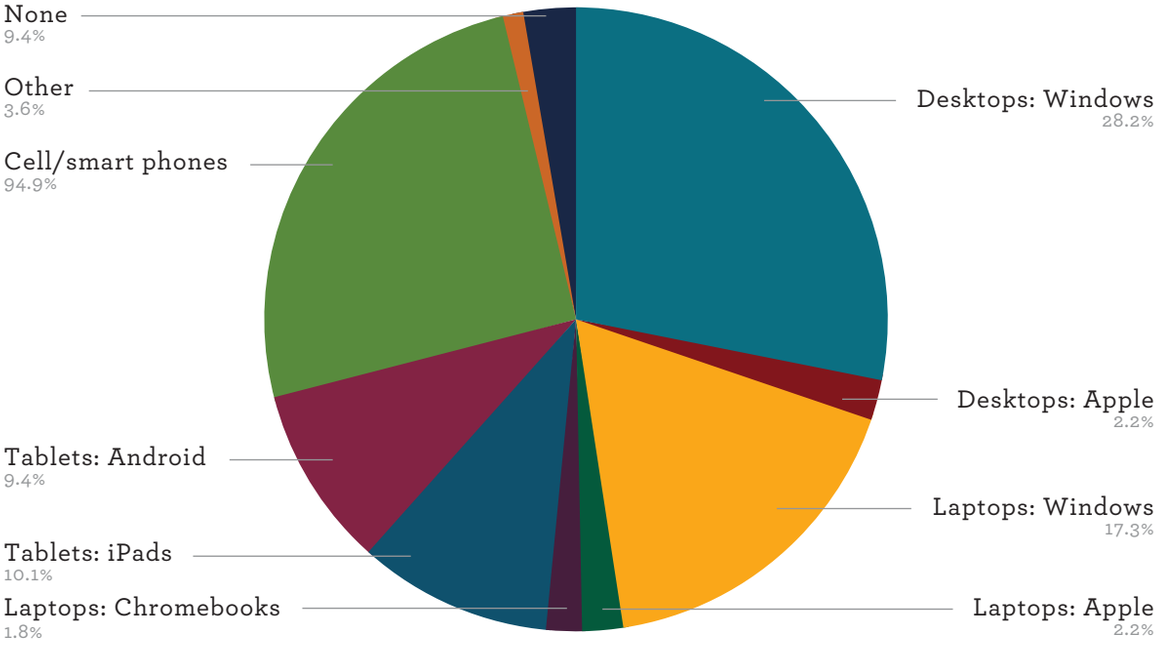

Figure 1.5: What hardware are you using?

To get a full sense of the range of software being used in Brazil, we made the question, "What sites or applications does your school use?" free response. There were 94 different applications mentioned in these responses, being used either by students, teachers, or administrators. The two most popular responses cited were Google products (26.5 percent) and Khan Academy (14.5 percent). Other notable sites include school- or state-specific portals, YouTube, Microsoft Office, and Code.org.

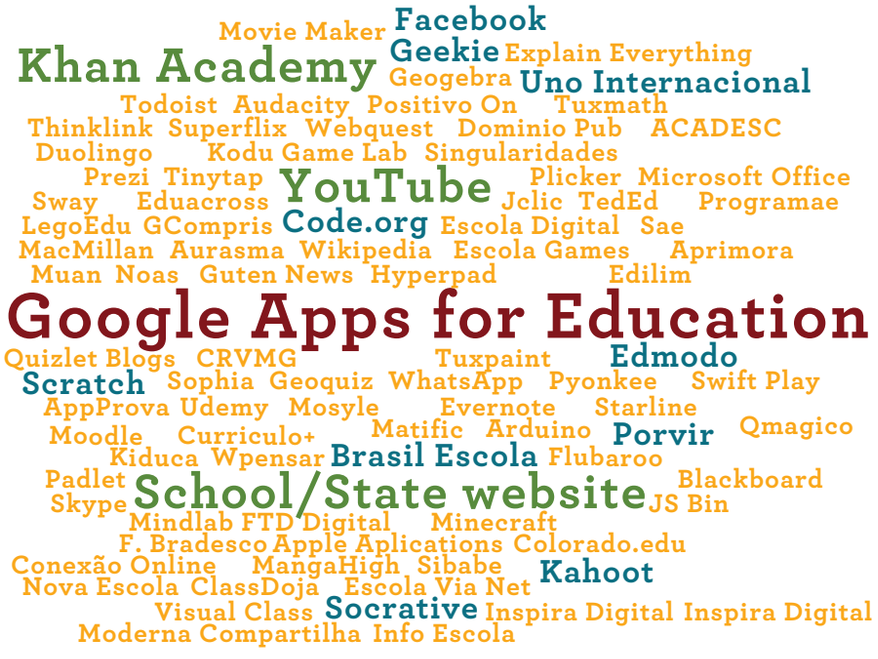

Figure 1.6: What software are you using?

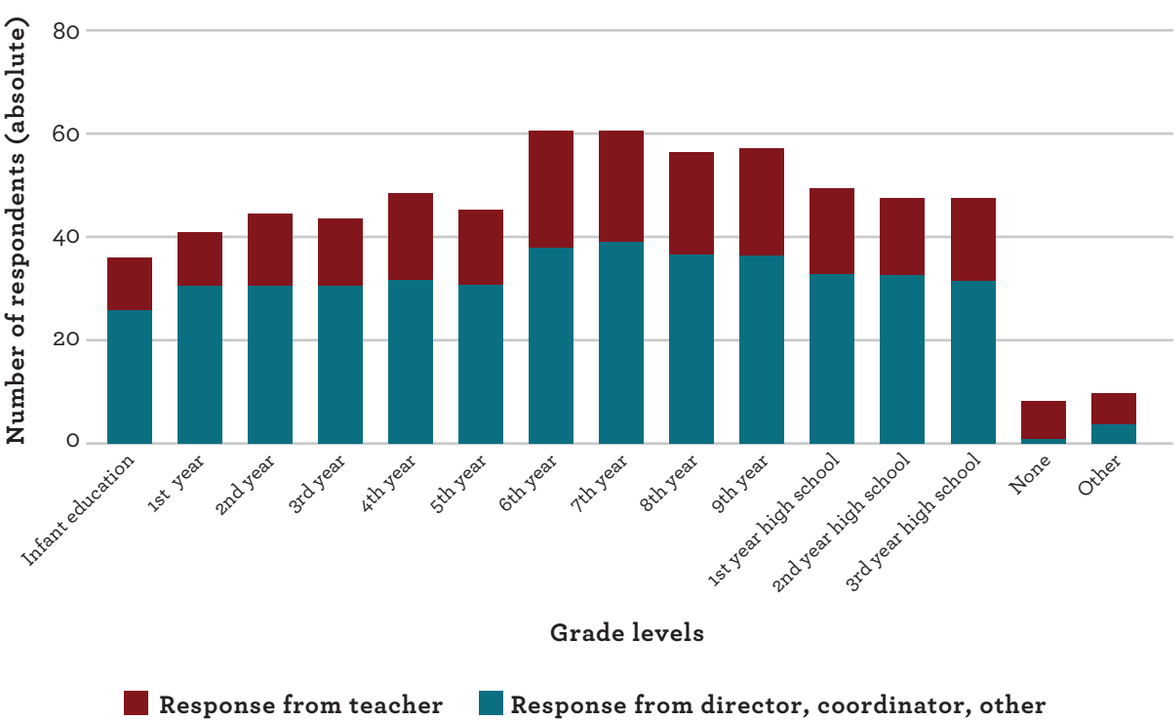

Figure 1.7: What grade levels [do you teach that] are using technology?

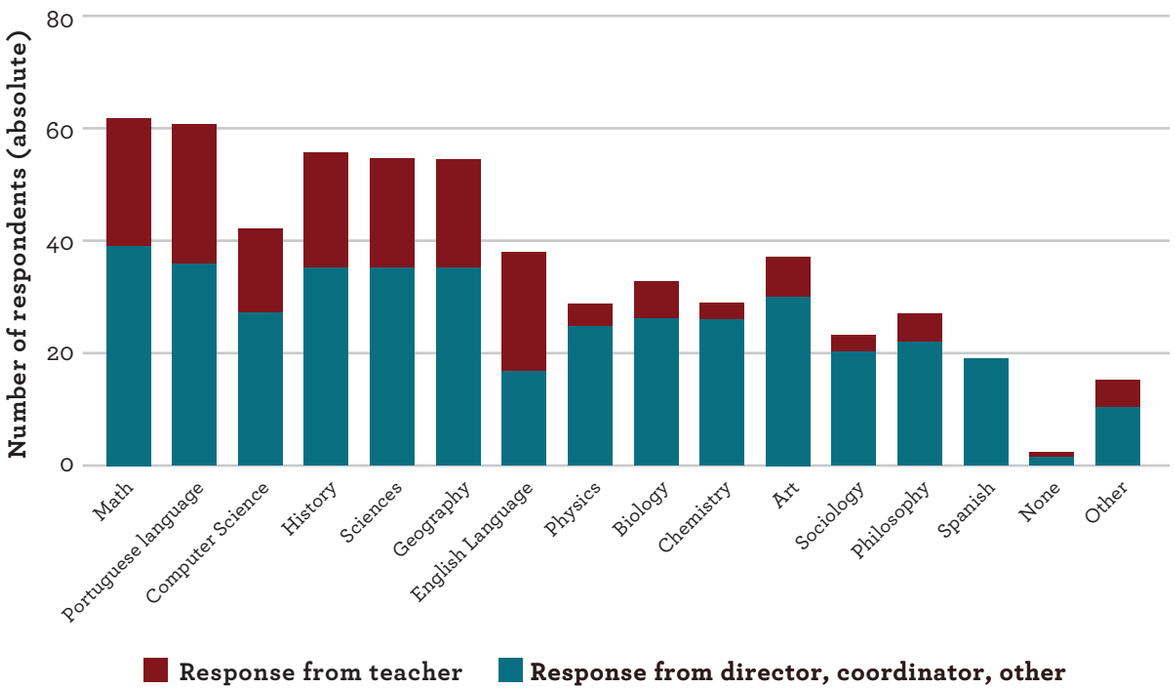

Figure 1.8: What subjects [do you teach that] are using technology?

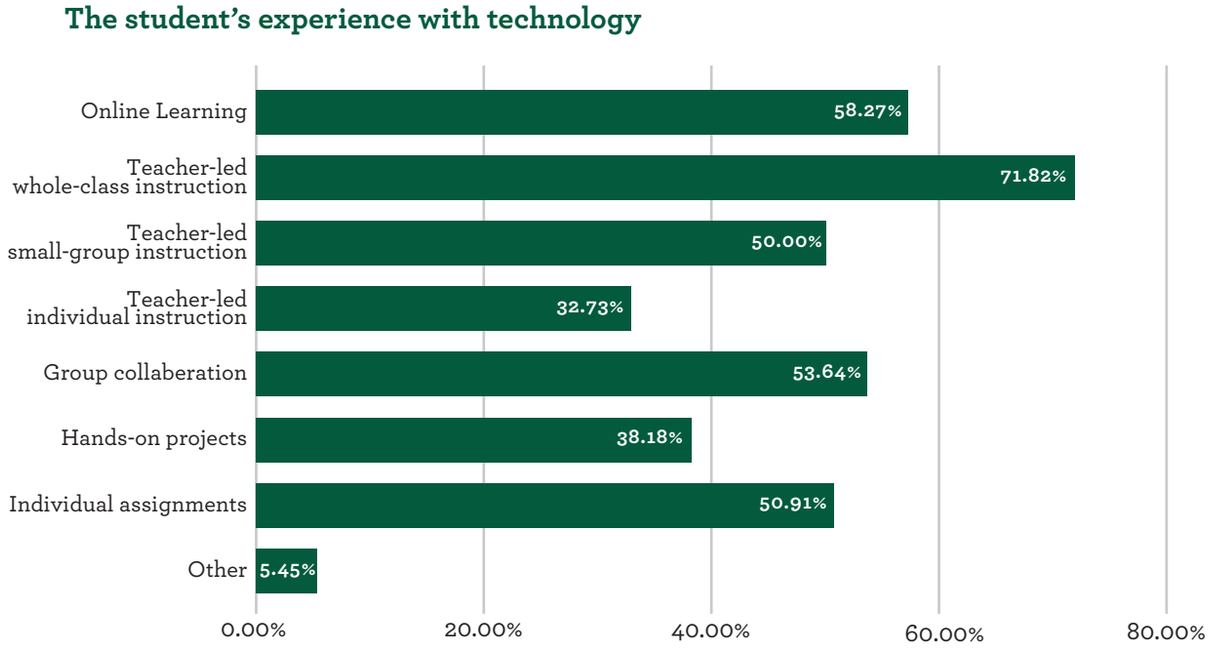

Figure 1.9: What types of learning does a student engage with in a typical week?

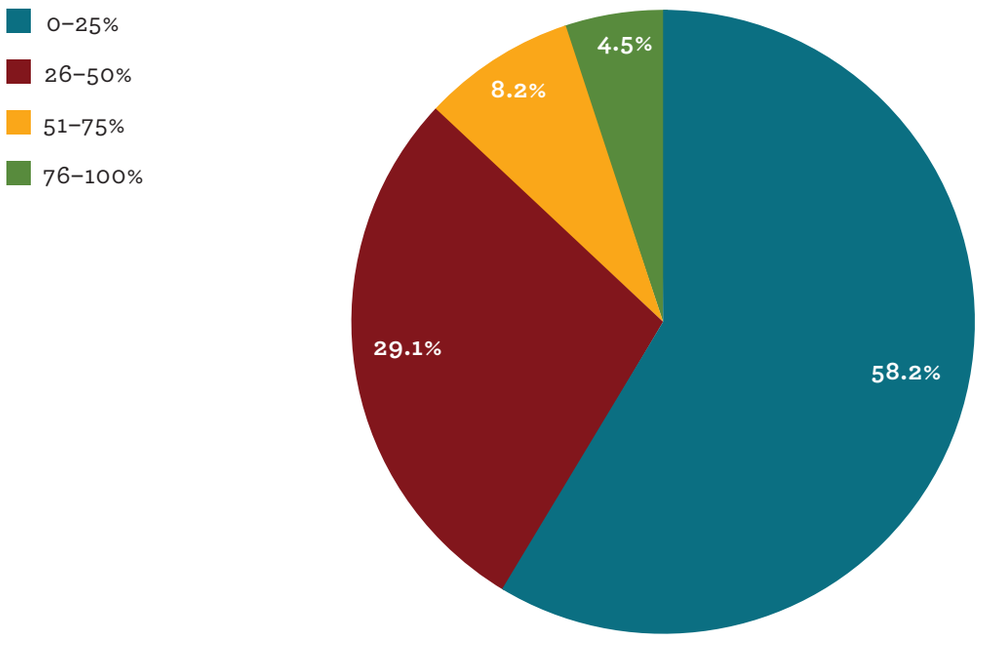

Figure 1.10: What percentage of student learning time is spent online weekly?

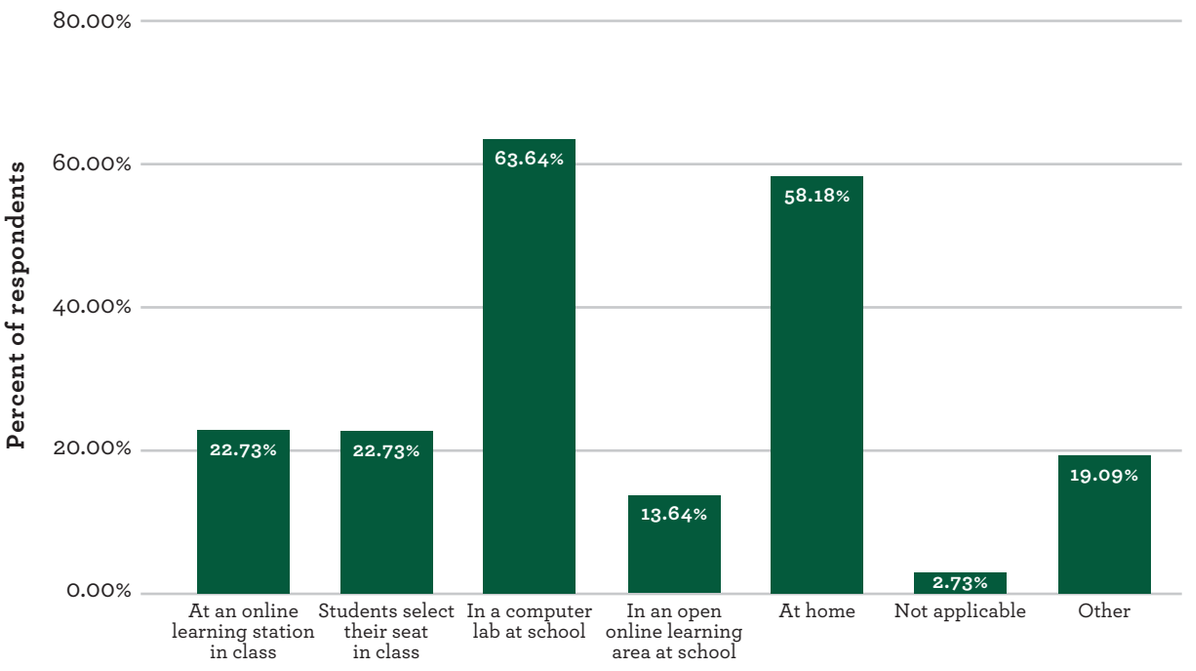

Figure 1.11: Where do students complete their online assignments?

In an additional, optional free-response question, we gave respondents the chance to tell us how student learning has changed with the use of technology. Ninety-seven educators chose to answer this question, and the most frequently cited ideas were that using technology has increased student interest and engagement in their learning (34 percent), increased their knowledge and/or academic performance (13 percent), given students autonomy in their studies (13 percent), and has diversified the ways students learn (ten percent). Others also mentioned that technology has helped to personalize student learning (eight percent), made classroom research easier (seven percent), and increased communication and collaboration among students and teachers alike (seven percent).

The teacher's experience with technology

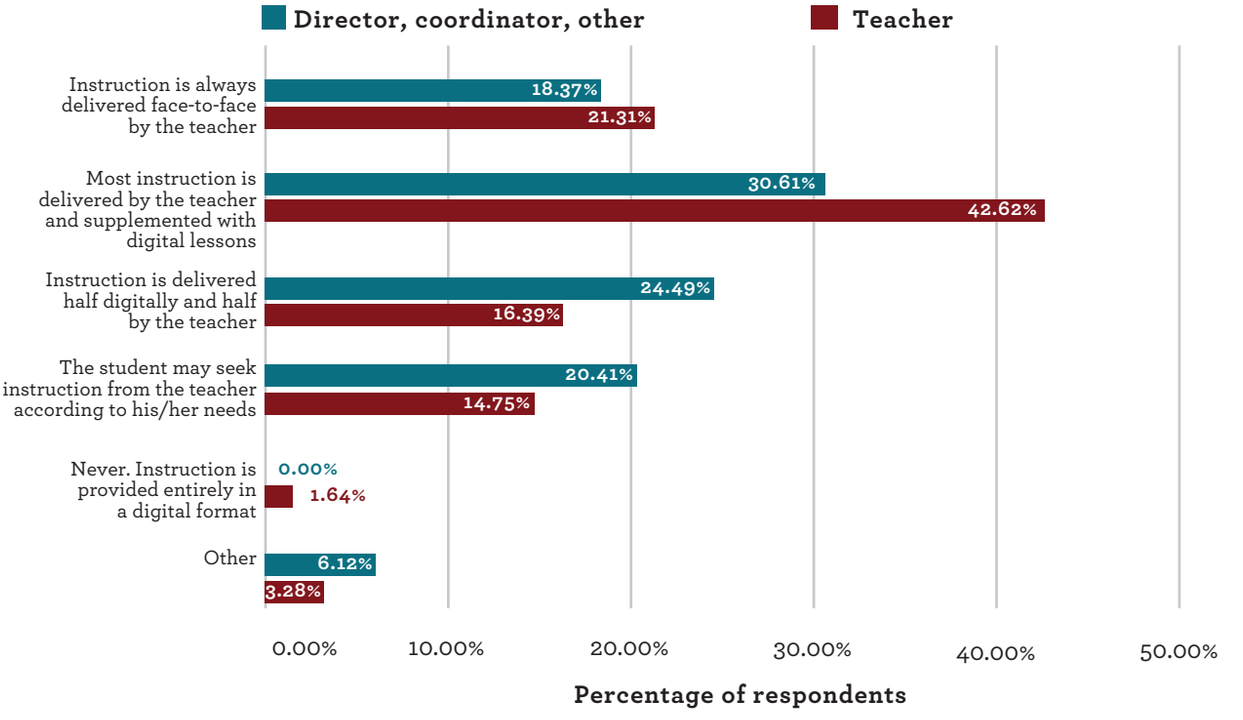

Figure 1.12: How often do you/teachers give face-to-face instruction?

In an optional free response question, we asked if educators collect data from the technology that they use in the classroom, and if so, how. Almost a quarter of those who responded to this question said that they did not collect data from the technology. From the remaining respondents, the most popular methods of data collection were via the applications that they used to distribute or manage content (such as Khan Academy or the LMS Mosyle), as well as through alternative questionnaire platforms such as Google Forms.

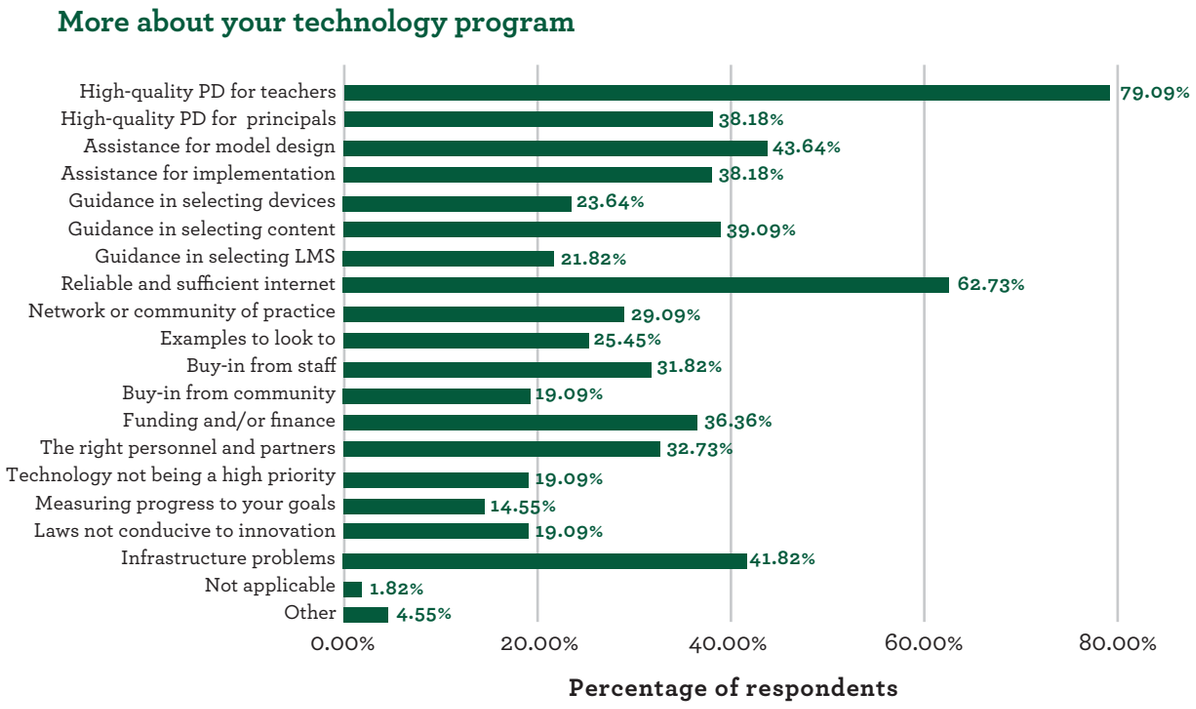

Figure 1.13: What are your key challenges when using technology?

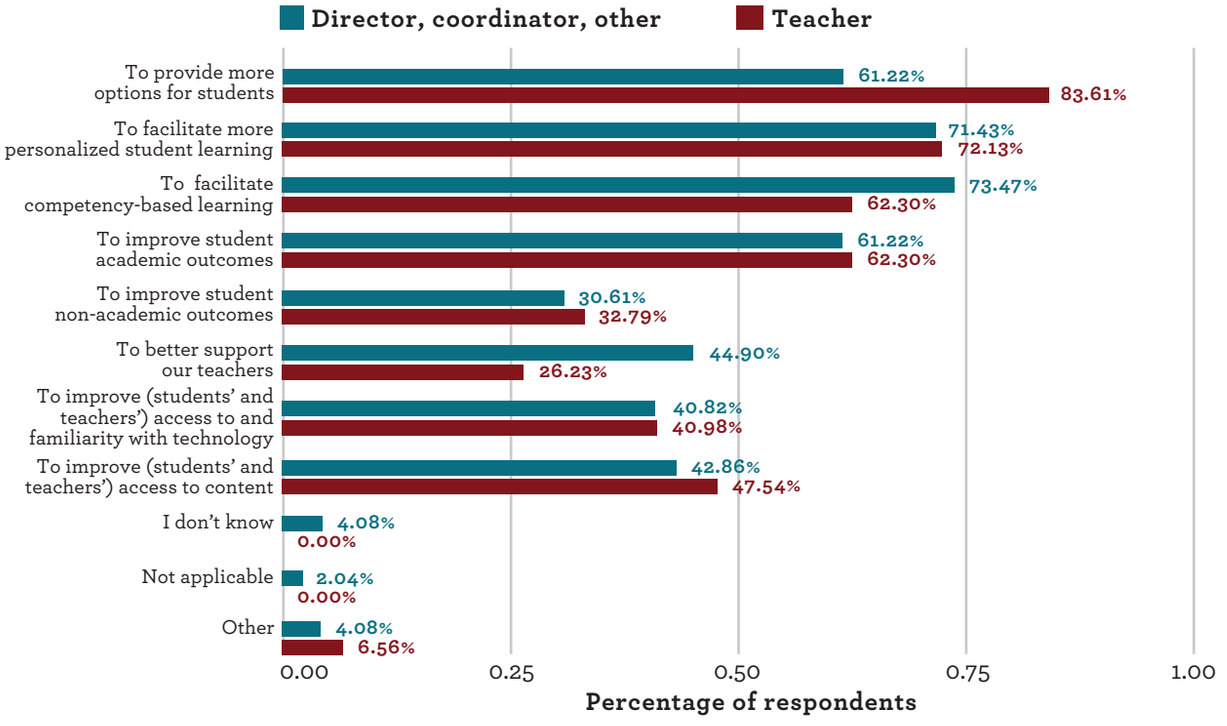

Figure 1.14: Why did you/your school decide to use technology?[14]

14. Note that the terms competency-based learning and personalized learning fall among the response options to this question. The two terms represent evolving practices and still prove difficult for the education field to pin to a universal definition. The survey therefore did not offer definitions to respondents. Future studies, however, may wish to pilot the survey to pressure test language such as these terms and provide definitions in the full-scale survey. To offer readers here a sense of these two emerging practices, we suggest looking to iNACOL's well-regarded working definitions. Competency-based learning, as defined in 2011 by iNACOL, is "a system of education, often referred to as proficiency or mastery-based, in which students advance and move ahead on their lessons based on demonstration of mastery. In order for students to progress at a meaningful pace, schools and teachers provide differentiated instruction and support." In 2013, iNACOL provided a working definition of personalized learning as the "tailoring learning for each student's strengths, needs and interests — including enabling student voice and choice in what, how, when and where they learn — to provide flexibility and supports to ensure mastery of the highest standards possible." Refer to Patrick, Kennedy and Powell, 2013, for more detailed overviews.

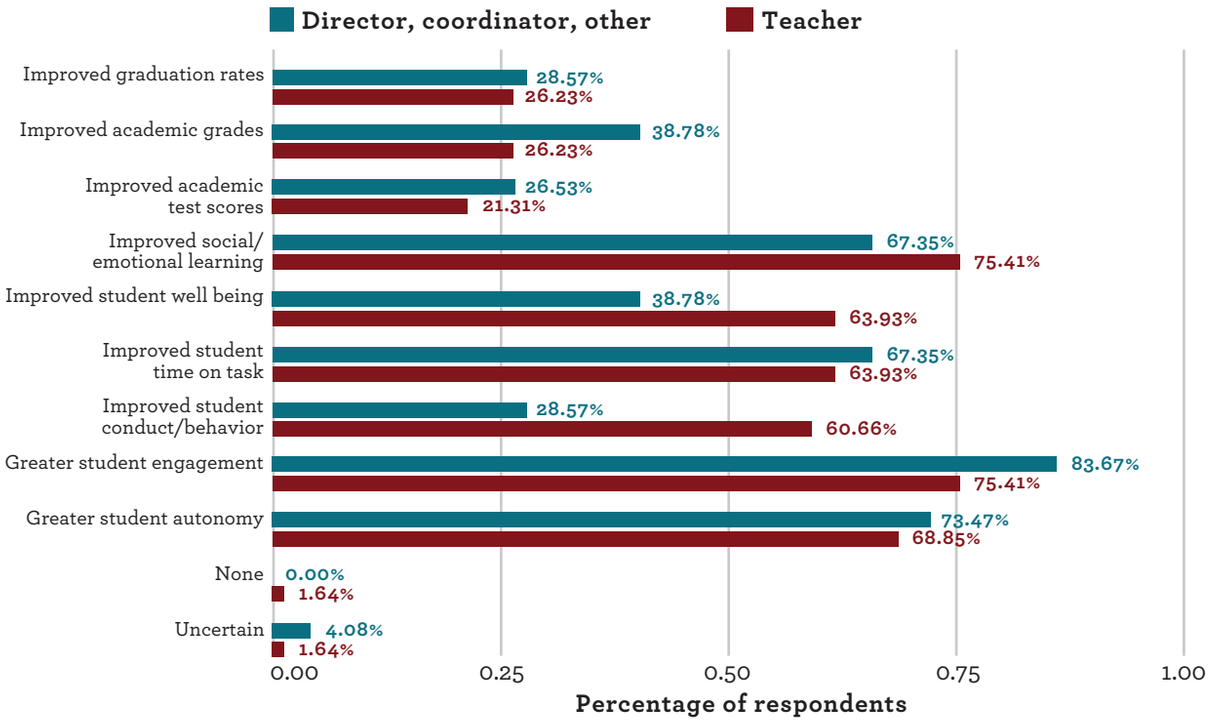

Figure 1.15: How do you/your school define student success while using technology?

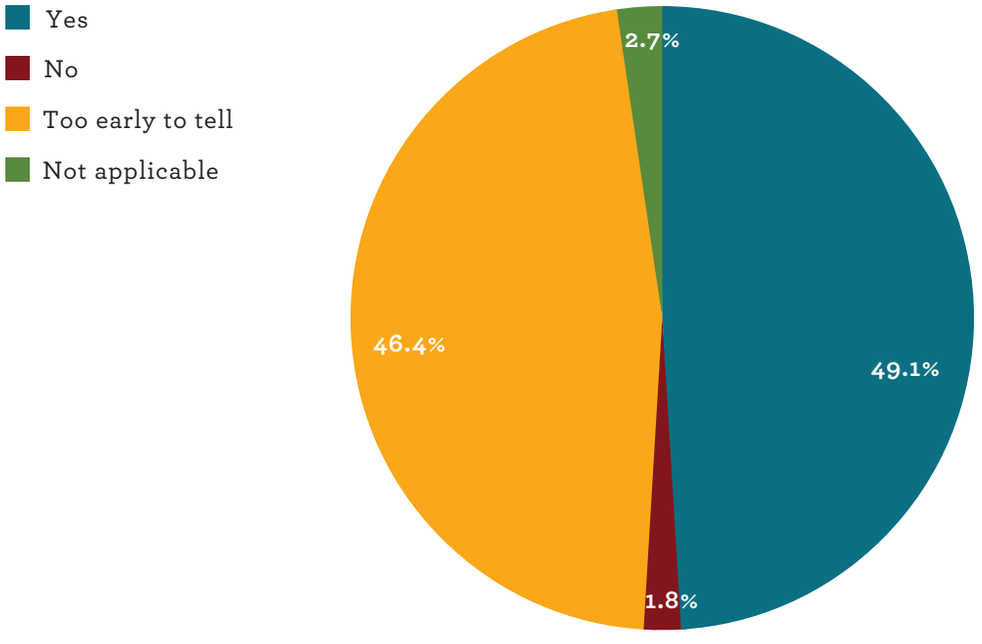

Figure 1.16: Has using technology produced the results you wanted?

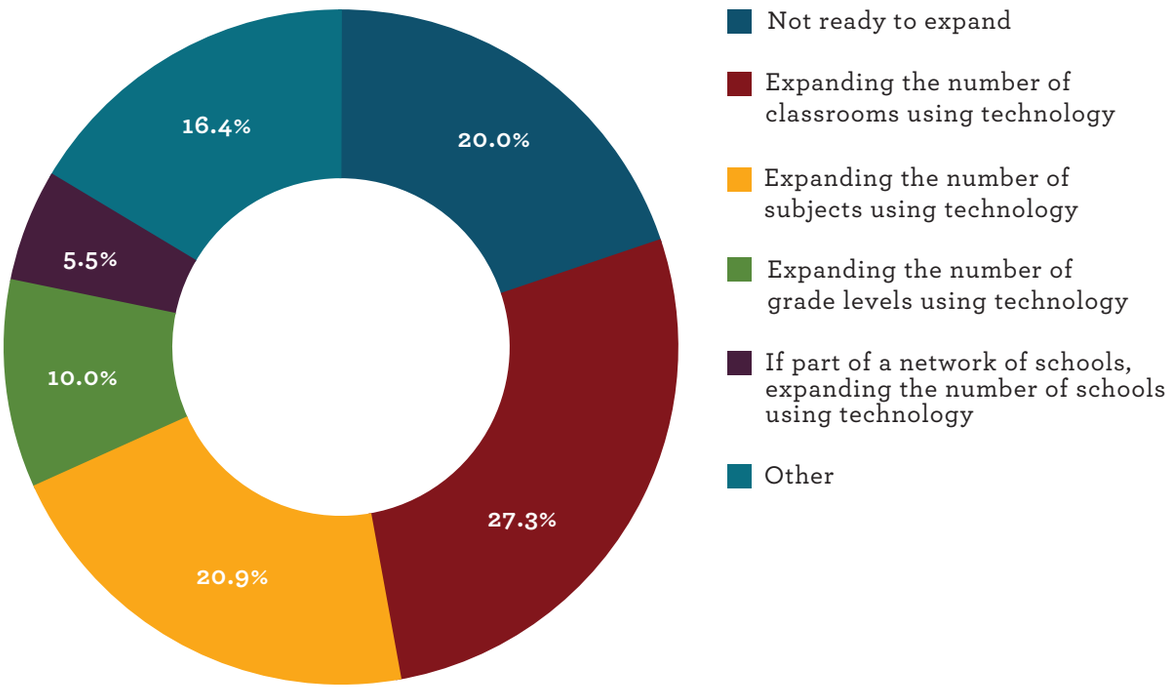

Figure 1.17: Do you/Does your school plan to scale technology efforts?

Analysis

1. Connecting online and offline instruction

A vast majority of survey respondents (94 percent) reported using online learning in some way, without major differences between public and private school responses (91 versus 96 percent, respectively). Among those who are using online learning, a majority of respondents (79 percent) reported that online-learning activities are connected with offline activities. This might be a leading indicator that blended learning is occurring in those respondents' schools and classrooms. However, our additional, school-specific case studies revealed that just over half of schools that said they were integrating technology were actually implementing blended instructional models, while the remainder were tech-rich. In a similar vein, in the survey, despite reporting that online learning was happening in the majority of schools, only 57 percent of respondents reported that their students actually engage in online learning in "a typical week" of school. Additionally, in the survey teachers were more likely to report using technology as a supplement to traditional instruction, while over 70 percent reported maintaining traditional teacher-led lectures in their instructional model. And almost a quarter of respondents said that they did not connect online and offline learning while, relatedly, a quarter also said that they did not collect data from the technology that they were using.

Given that this data emerged against the backdrop of nearly all respondents reporting the use of "online learning in some way," we hypothesize that there may be a number of school models afoot that use technology but are not fully blended. For example, technology may be being used in a tech-rich manner to coordinate learning or facilitate research, rather than to deliver content. Alternatively, students may be learning some content online, but any such learning occurring online is not shaping offline learning experiences, because teachers are not pulling data from those online activities to inform their practice

2. Gauging subject- and grade-level technology use

Respondents reported a nearly even distribution of technology use across all grade levels, with a slightly greater number reporting using technology in middle grades. Respondents reported using technology nearly equally across core subject areas, including math, Portuguese, history and sciences. Fewer respondents reported using technology to deliver online content in non-core subjects, such as computer science, arts, or specialized science classes such as Chemistry, Physics, or Biology. The fact that respondents are managing to bring technology to bear in core subjects across a wide range of grade levels is encouraging. This suggests that for the subset of such schools and classrooms that are integrating technology in a blended manner, there is at least some market of tools supporting these core subject areas and/or that teachers are managing to create online content to support a range of core subjects. Otherwise we would expect to see a dip in particular core subjects.

3. Accessing online learning at home and in labs

Respondents reported that online learning was occurring most often either in computer labs (64 percent) or at home (58 percent). Although where online learning might occur does not specify which models schools are adopting, given the emphasis on at-home learning, it is not surprising that in 3 of our 8 case studies, schools were using a flipped classroom model. In this model, students watch videos or review learning material online at home and then come to school to do exercises or 'homework' in class with teacher and peer support. We hypothesize that this emphasis on learning from home may in part be due to the relatively short average school day in Brazil. As one teacher described, "We started implementing Flipped classrooms because we wanted to make the most of the time that students spent outside of school: since students only go to school half day, the other half can be used to prepare materials for the following day in class." By comparison, only 23 percent of respondents reported students completing online assignments at a "station in class."

4. Tackling connectivity and infrastructure

Both internet connectivity and infrastructure ranked high among challenges facing schools and educators implementing technology. Over 60 percent of respondents said that internet connectivity posed a challenge, and 42 percent said that infrastructure more broadly posed challenges. A number of schools that we visited echoed these concerns. Although every school that we visited had wi-fi, the reliability of their networks varied. That said, some schools appeared to be finding workarounds to tackle these challenges and managing to deliver blended learning. For example, at one school in which the history teacher had created a blended individual rotation model, he had managed to build the model in spite of poor connectivity. To make up for the lack of internet in the classroom, the teacher downloaded all online activities ahead of class so that students could reliably interact with content.

5. Building teacher buy-in and professional development

An overwhelming 79 percent of respondents reported that access to high-quality professional development for teachers is a challenge. This was the most common challenge cited by respondents. During our school visits, leaders and educators cited teacher buy-in to pursuing new, blended models as a related, additional challenge. At one school, teacher buy-in was so important that the school's recruitment model now incorporates the blended-learning model and goals. They specifically seek-out potential hires who are open to the idea of blended learning and are eager to contribute to a more student-centered school culture.

Schools that we visited were not approaching professional development in any one way. That said, promising models appeared to be the leveraging of early adopter teachers and coordinators. One coordinator trained her peers on the coordination team, who then held workshops and development sessions for all the teachers at the school. These sessions were both conceptual and practical, which helped teachers truly understand what it means to use technology in a blended, rather than tech-rich, manner. The professional development program was also continuous; teachers met almost every week to discuss pain points and create lesson plans with coordinators.

6. Measuring satisfaction and progress guiding technology integration

Respondents reported that their most important measures of student success while using technology consisted of improved social emotional learning (72 percent) and greater student engagement (79 percent). Student academic outcomes, as measured by grades, graduation rates, and test scores, significantly lagged. In a separate question, respondents were split fairly evenly over whether technology had produced the results that they wanted (49 percent) or whether it was too early to tell (46 percent). The latter suggests that many schools are not using interim measures to gauge the efficacy (or lack thereof) of their technology integration.

Recommendations

Numerous variables, such as talent, funding and factors beyond the school walls, all inherently shape a blended model. The following recommendations, therefore, are aimed at how schools trying to leverage technology might do so with greater success, but are by no means meant to be comprehensive or exhaustive. Given the low survey response rates, we offer these recommendations as suggestions and hypotheses that ought to be further considered in the broader national and regional context.

Ensure that data produced in lab-based or at-home online learning integrates back into the classroom

In instances when online learning occurs primarily in computer labs or at home, schools and educators should find deliberate ways to ensure that those online activities can shape offline instruction in face-to-face classrooms. This requires connecting the results and data from home- or lab-based online activities to how teachers use offline time in their face-to-face classes. Otherwise, schools risk investing in online activities and infrastructure that fails to shape offline instruction in an integrated manner than could drive differentiation and student outcomes.

Ensuring that this occurs might be easier if schools adopt common and consistent processes that bring student data into focus. For example, teachers can use common data dashboards or look at student data together in professional learning communities (PLCs) on a weekly basis to drive instructional decision making. For schools aiming to drive student agency, educators might even encourage students to "own" their individual data produced through online learning exercises and then set aside time during class to conference with students to discuss their performance and provide targeted feedback.[15]

Design learning models with infrastructure constraints in mind

The data suggests that school officials would be wise to double down on investments in infrastructure and connectivity. In the meantime, however, schools hoping to pursue blended-learning models should consider designing those models with infrastructure constraints in mind, rather than viewing those constraints as prohibitive to pursuing blended learning at all. Specifically, certain models may require less infrastructure than educators assume. Station and lab rotation models require fewer devices and less bandwidth to operate successfully. Likewise, selecting applications and tools that require less bandwidth, or have the option to download content ahead of time, could prevent fewer interruptions due to lack of connectivity. Finally, as some educators in the schools we visited described, teachers can either

15. For more on innovative approaches to student conferencing see Staker, H. "How to create higher performing, happier classrooms in seven moves: A playbook for teachers" Clayton Christensen Institute, January 2017. Available for download at https://www.christenseninstitute.org/wp-content/uploads/2017/01/How-to-create-higher-performing-happier-classrooms-in-seven-moves.pdf.

download materials ahead of class or provide back-up materials or worksheets for students in case computers or Wifi fail to work on a given day. While not ideal, these workarounds allow students to still access the benefits of technology, even in circumstances where infrastructure remains uneven at best.

In addition, relying on a Flipped classroom model specifically depends on students' homes or communities offering reliable access to devices and internet connectivity and/or materials that have been downloaded ahead of time for students to consume. Proponents of such models should take into account students' variable access to internet at home and provide alternative options, such as keeping computer labs open for more hours past the traditional school day, to ensure access. In addition, given that mobile penetration rates far outpace students' access to desktops, any software programs assigned to support at-home online learning should be vetted for offering mobile-friendly applications.

Pursue professional development focused on instruction, not just technology

Professional development ranked high among the challenges that respondents faced. School leaders, coordinators, and early adopter teachers should be mindful of providing ongoing professional development opportunities with focuses beyond narrow technology training. Based on our school visits, these efforts should move beyond exclusively instructing teachers how to use particular technology tools' features and functionalities, and instead aim to immerse teachers in why and how technology might support an entire instructional model.

Schools that we visited were pursuing a range of approaches that focused on instructional practice, rather than just technical fluency. Some were even using blended learning in professional development itself, to expose teachers to new learning models in their own professional learning. As one teacher put it, "The PD can't just be conceptual—teachers and coordinators need to experience learning in a blended model so that they understand how to teach in one." Numerous schools that we visited also spoke to the importance of leadership working to support teachers—rather than merely mandating new technology-related efforts. As one leader put it, "If you want your program to be successful, then you need to have everyone on board, and that means listening to and learning from your teachers so that you can understand how to better support them." To solicit this feedback from teachers, schools just starting to implement new models might consider teacher surveys and professional learning communities to gauge how teachers are adapting to technology in their classrooms.

Ensure that success metrics provide useful proxies for learning outcomes

Metrics matter, because innovations scale against the metrics to which we hold them. Based on the survey responses, the most common outcome metrics guiding technology integration focused on student engagement, autonomy, and social-emotional factors, more than on academic measures like grades or test scores. Typically, factors like engagement and social emotional learning can be seen as levers to yield better academic outcomes. That said, focusing exclusively on these non-academic metrics might not lead a school to pursue blended learning outright. Were a school pursuing a tech-rich model rather than a blended-learning model, it could theoretically be using technology to 'engage' students—for example, through online research projects or new technology gadgets—without incorporating online learning into its model. The risk, then, is that technology could drive engagement without transforming corresponding learning outcomes. To mitigate this risk, school officials should be purposeful about the measures they use to gauge success. In those environments in which technology efforts focus primarily on non-academic outcomes, leaders should regularly check for correlations between factors like engagement with academic learning outcomes.

Moreover, schools should plan upfront to implement interim measures that could help educators and administrators gauge whether technology integration is producing its hoped-for outcomes. The fact that nearly half of respondents (46 percent) reported that it was "too early to tell" whether technology was having its desired effect suggests that schools need such interim benchmarks indicating their progress against longer term goals. For example, low-stakes student surveys or interim academic assessments, or A/B testing between classrooms that have or have not integrated technology, could start to give educators and leaders a better sense of the efficacy of their efforts. Additionally, measuring smaller, early stage efforts can make innovating feel safer, while still pushing towards new learning approaches and better outcomes. Numerous schools that we visited cited pilots in one or a few classrooms as the best place to start. As one teacher said, "If you wait to apply new methods until you are 100 percent certain of their success, you will never start."

Target pockets on hard-to-offer coursework

Respondents cited relatively even rates of technology use in core subject areas. That said, integrating technology into non-core subjects was not reported at as high of levels. Given that this gap is partly due to fewer teachers reporting teaching those subjects, this in part suggests that our survey may have simply reached fewer teachers in non-core subjects. However, non-teacher respondents likewise reported technology usage at lower rates in non-core subjects, which would not be subject to the same bias in the sample.

This difference between technology use in core versus non-core subjects may represent an area of development and opportunity for government-led or private entrepreneurial edtech efforts. This is particularly true given that educators overwhelmingly (74 percent) said that their school chose to begin using technology in an effort to "provide more options to students." However, based on survey responses, options for courses otherwise not offered on a face-to-face basis does not appear to be the main driver behind technology integration efforts in our sample. Disruptive innovation theory suggests that online courses and software are well-suited to expanding students' options in course and subject areas where students' alternative is nothing at all (Horn and Staker, 2015). These pockets not only represent areas to expand access but could also provide promising, lower-stakes subject areas to experiment with new technologies or instructional models that might gradually improve over time to enhance core subject areas as well.

Malaysia

Basic education at a glance

5.6 million students

420,000 teachers

Student to teacher ratio is 13:1

10,182 public schools (NationMaster)

170 international schools (The Star, 2017)

15% of students are in private schools (Emerging Strategy, 2016)

28.2% tertiary enrollment (NationMaster)

The foundations of Malaysia's modern education system emerged during the 1950s with the call for a single, centralized national system of education. A document titled the Razak Report described this vision of a single, national system, which the government enacted in the Education Ordinance 1957, after the country gained independence from the British earlier that year (Liu et al., 2013).

Throughout the first half of the 20th century, the country's three principal ethnic communities—Malays, Chinese and Indians (primarily Tamils from South India)—each ran their own schools in a relatively localized manner. The 1957 law marked the creation of a common curriculum for all government schools across the country, the Malaysian national curriculum, which public schools nationwide still follow today.[16] Consistent with this effort to nationalize both operations and curriculum, according to The World Bank, Malaysia's education system remains among the most centralized in the world, as measured by central government control over school-based hiring, policy, and curriculum decisions (Sander, Jalil, & Ali, 2013).

Today, public education in Malaysia is free for children through age eighteen. Government spending on primary and secondary education averages about 3.8 percent of Malaysia's annual GDP (2011). Six years of primary education is compulsory. Although secondary education is not obligatory for Malaysian citizens, there is a laudable 98.87 percent enrollment rate (2008) at the secondary level. The country has also managed to offer above-average equity of access to education opportunities across rural and urban areas, ethnic groups, and children of different socioeconomic levels compared to other countries in the region (OECD, 2013). Despite high rates of enrollment and inclusion, Malaysia still witnesses variable results among students. According to the 2012 PISA exam, 51.8 percent of Malaysian students scored below a

16. For more on the history of centralization in Malaysian education policy and practice, see Malakolunthu & Rengasam (2017).

Level 2 proficiency in mathematics. Scores in reading (398) and science (420) are well below the OECD average of 496 and 501, respectively. Among their surrounding East Asian countries that participated in the 2012 PISA, Malaysian students only outperform their peers from Indonesia (OECD, 2013).

To tackle these challenges, the Ministry of Education initiated the 2013 Malaysia Education Blueprint which established clear, ambitious goals for the education system to accomplish by 2025 (Ministry of Education Malaysia, 2015). The Blueprint identifies five key system-wide aspirations: to achieve 100 percent enrollment from preschool to upper secondary by 2020 (access); to be in the top third of countries in international assessments (quality); to yield a 50 percent reduction in achievement gaps (equity); to enhance shared values and experiences by embracing diversity (unity); and to maximize students outcomes within the current budget (efficiency). As part of the effort to reach these aspirations, the ministry outlined eleven shifts to transform the system, which include leveraging information and communication technologies (ICT) to scale quality learning across the country.[17]

In this vein, the government aims to provide internet access and virtual learning environments for all 10,000 public schools (known as the "1BestariNet project"). The plan also calls for efforts to "augment online content to share best practices among teachers" and to "maximize the use of ICT for distance and self-paced learning to expand access to high-quality teaching regardless of location or student skill level" (Ministry of Education Malaysia, 2015).

Nearly four years in, the government has completed the first of three waves for the technology-specific goals articulated in the Blueprint. In addition to rolling out an online platform called Frog VLE (virtual learning environment), they have also rolled out the Network Deployment Programme to a majority of the country's public schools, which offers 4G internet connectivity in three specific locations in schools, provided by the YTL telecommunications company Yes. These accomplishments supplement a 15-year old Smart School Initiative equipping all public schools with hardware, either in the form of desktops or Netbooks. Most recently, the Ministry of Education partnered with Google and YTL Communications, an internet and mobile communications provider, to deploy Chromebooks in schools.

17. The 2013 Blueprint, however, is not the first time the ministry has stated its dedication to minimizing the digital divide in Malaysian society. Since 1997, the ministry has prioritized information and communications technology (ICT) integration, starting with the Smart Schools project, a master plan for enabling all government schools technology tools. In addition, the ministry led separate initiatives related to digitizing schools. First, the "computerisation programme" aimed to add computer labs to public schools. A second project set out to convert schools entirely from textbooks to ebooks. The pilot started with 90 schools and was completed in 2002. The stated goals for ICT integration included, reducing the digital divide between the country's schools by enabling ICT access for all students; using ICT as teaching and learning tools in education, taught as an independent subject and integrated into others; and using ICT to enhance efficiency, effectiveness and productivity of management in education. For more, see Chan (2002).

Partnerships & Survey Methodology

To administer our blended-learning survey we forged a partnership with FrogAsia. FrogAsia is a subsidiary of the YTL Group, one of Malaysia's leading integrated infrastructure conglomerates and is a sister company of Frog Education Ltd., an education technology company based in the United Kingdom. We chose FrogAsia as a partner given its reach throughout the Malaysian public school system. Through the government's 1BestariNet program, FrogAsia's learning management platform Frog VLE (virtual learning environment) is available to approximately all 10,000 public schools in Malaysia. As such, its user base provided us access to a comprehensive sample of all public schools across the country. We also attempted to survey Malaysian private schools through a variety of intermediary channels. However, we did not receive sufficient responses to merit including those in the data set.[18]

FrogAsia distributed the survey to a subset of its users via the messaging applications WhatsApp and Telegram. The survey reached an estimated 4,100 educators and administrators from all over the country in the FrogAsia network. FrogAsia sent the survey out twice over the course of two weeks during the spring of 2017.[19] From there, we received a total of 132 completed responses to our survey. A total of 205 additional responses were started, but not completed.[20] Finally, at the beginning of the survey we asked respondents, *"Do you/Does your school use online learning in some way? Meaning, some or all of the instruction takes place using internet connected hardware/software?"* Out of the 132 total responses, 13 noted that their school did not use online learning. We have controlled the data below by including data only from respondents who affirmed that their school uses online learning in some way. In other words, the graphs below summarize the data from 119 completed, public, primary and secondary education responses that are using online learning in their school.

From the 132 survey respondents, we then visited 13 schools all of which indicated that they were using technology in their school to some degree. Eleven of these schools completed the survey, while two had started but never finished and their answers are not included in the survey data below. These were all public schools chosen for their geographic diversity: they are located in six of thirteen Malaysian states, and one of three federal territories. Of those 13 schools, we determined that eight were using blended-learning models. The other five were tech-rich models, which we will discuss further in the discussion below. Summaries of these eight schools can be found in *Appendix D*.

18. The results of direct email communication with 199 schools gave us five total responses, at a rate of 2.6 percent. Given the small sample size, we will not include that data here, but strongly recommend private school surveys as a promising area for further research.

19. FrogAsia sent the survey once on April 4, and again on April 18. We closed the online survey instrument and downloaded a full dataset on April 28.

20. See footnote 12 for a discussion of incomplete responses.

Data Summary

Tell us about yourself and your school

The responses we received were geographically diverse, representing ten of 11 states and one of three federal territories. The map below shows the distribution of survey respondents.

Figure 2.1: Map of survey respondents in Malaysia

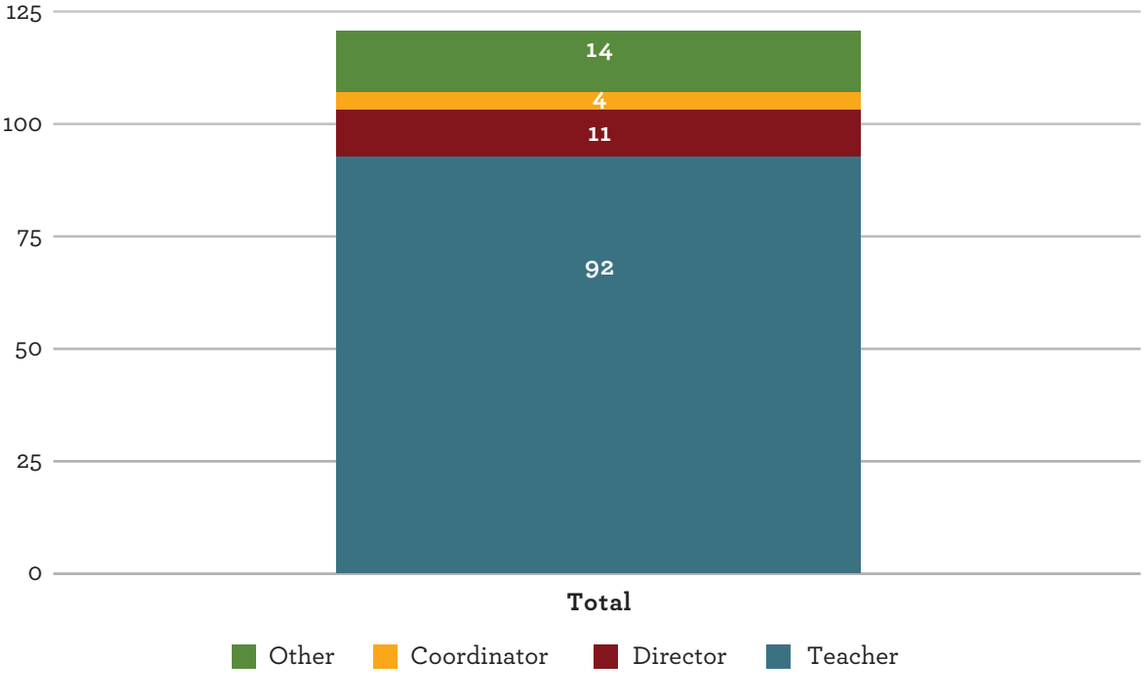

Figure 2.2: Respondent job titles

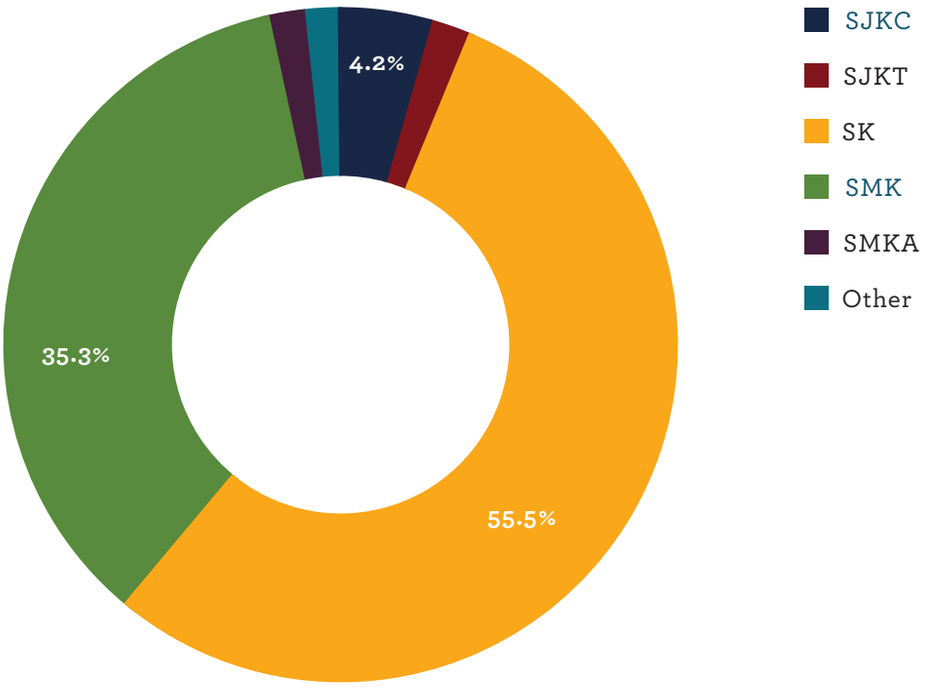

Figure 2.3: School types

How are you using technology?

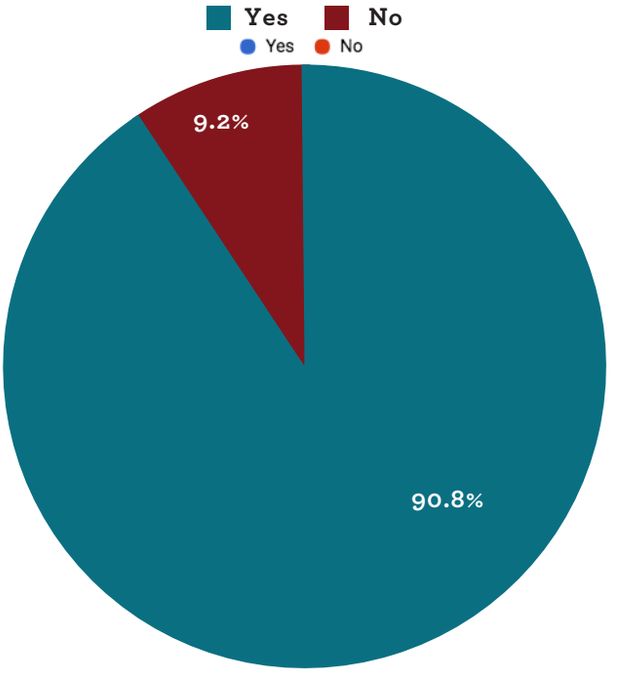

Figure 2.4: Are online and offline activities connected in some way?

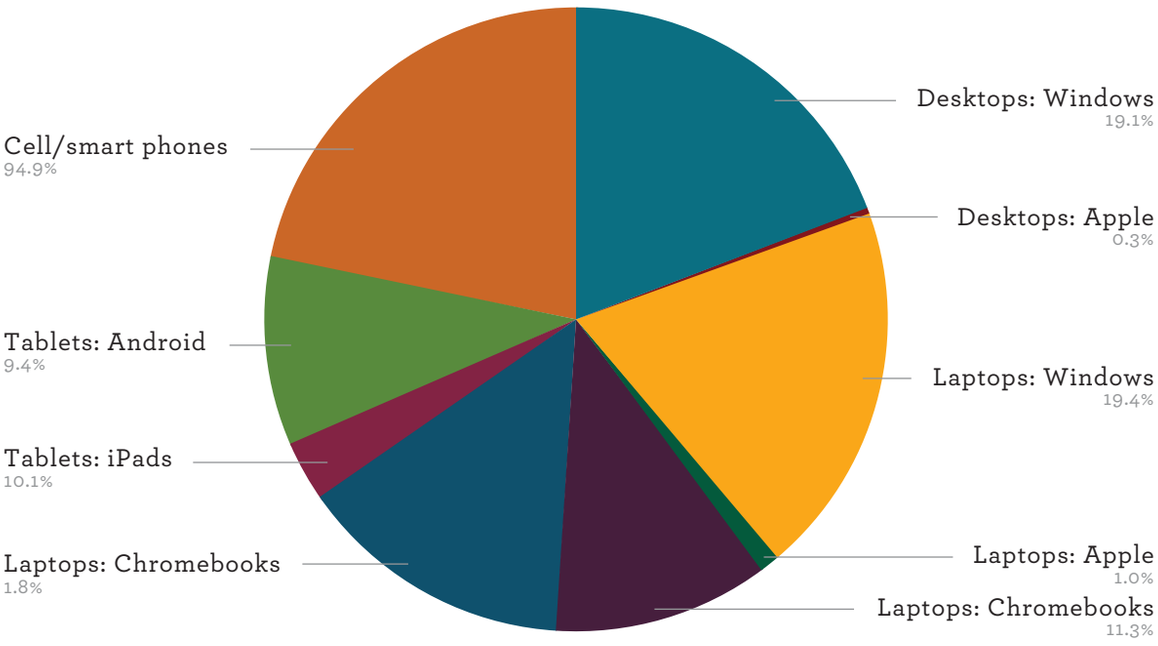

Figure 2.5: What hardware are you using?

Figure 2.6: What software are you using?

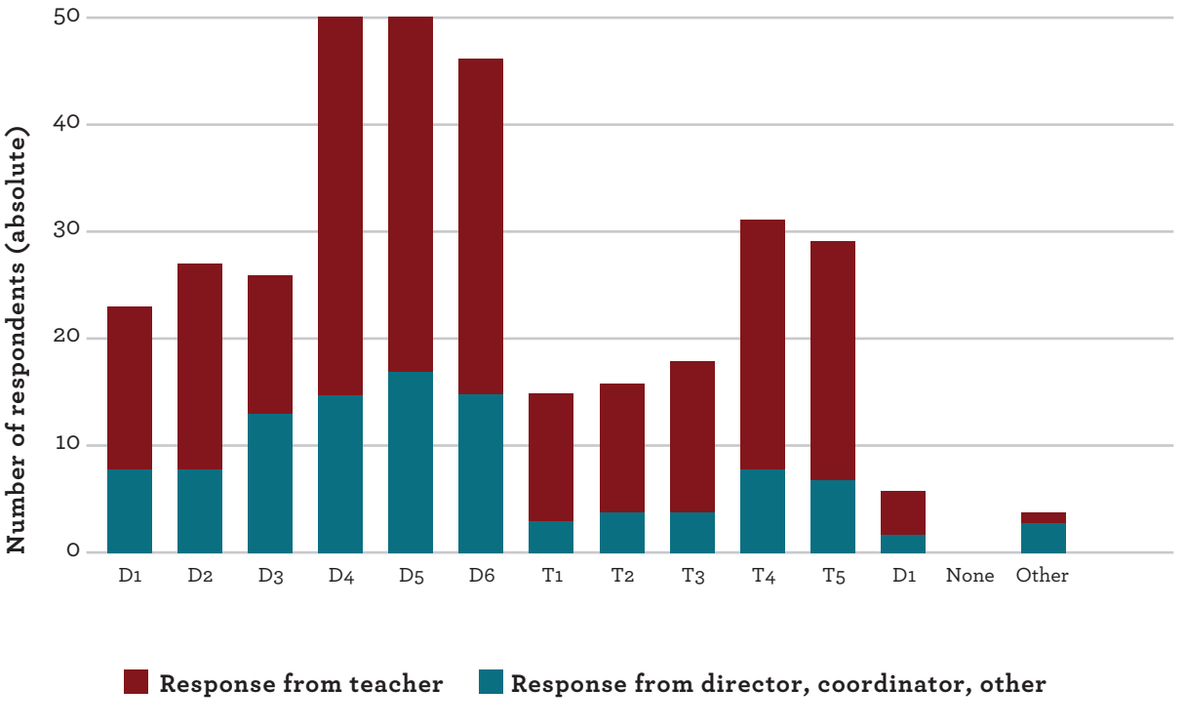

Figure 2.7: What grade levels [do you teach that] are using technology?

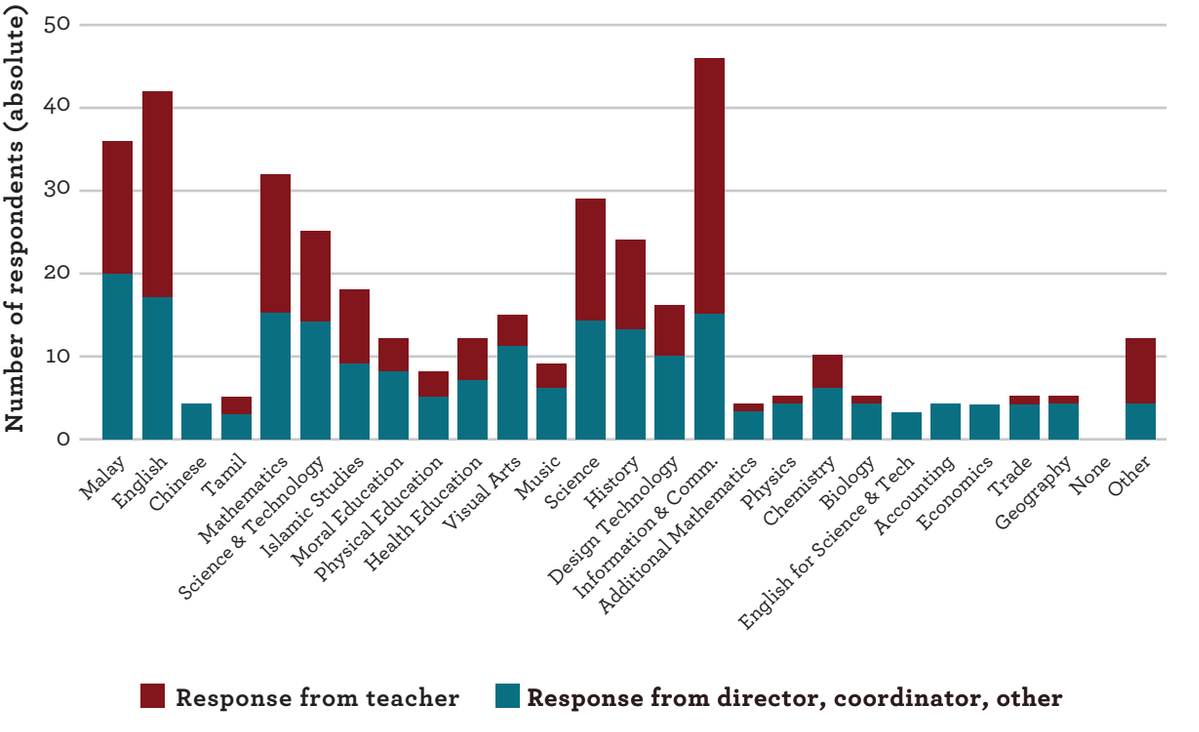

Figure 2.8: What subjects [do you teach that] are using technology?

The student's experience with technology

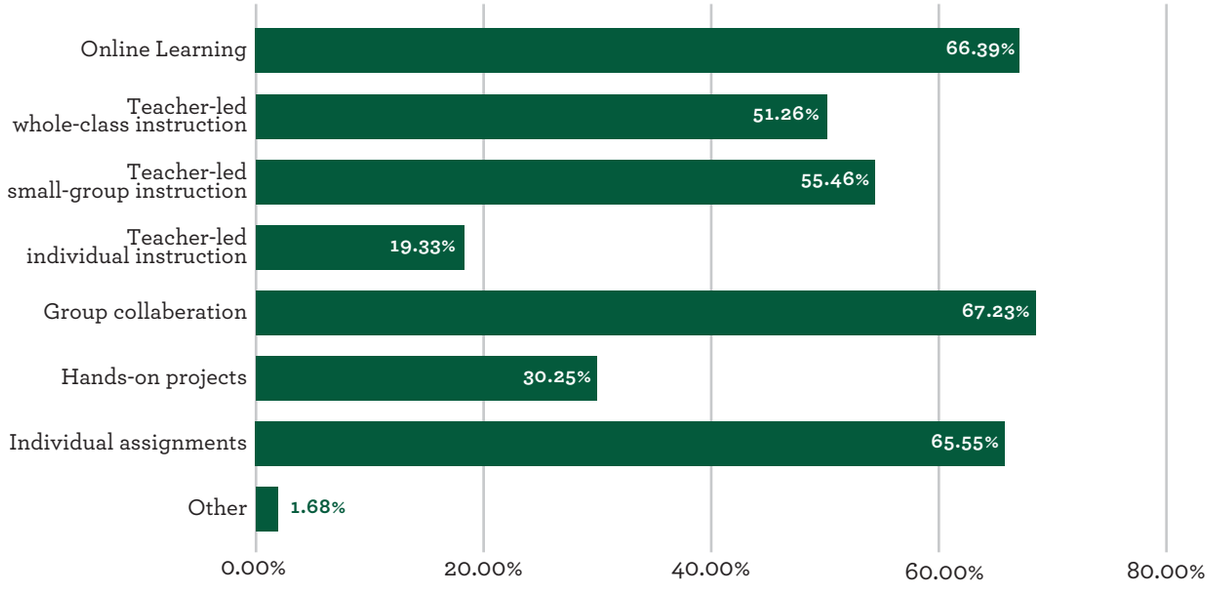

Figure 2.9: What types of learning does a student engage with in a typical week?

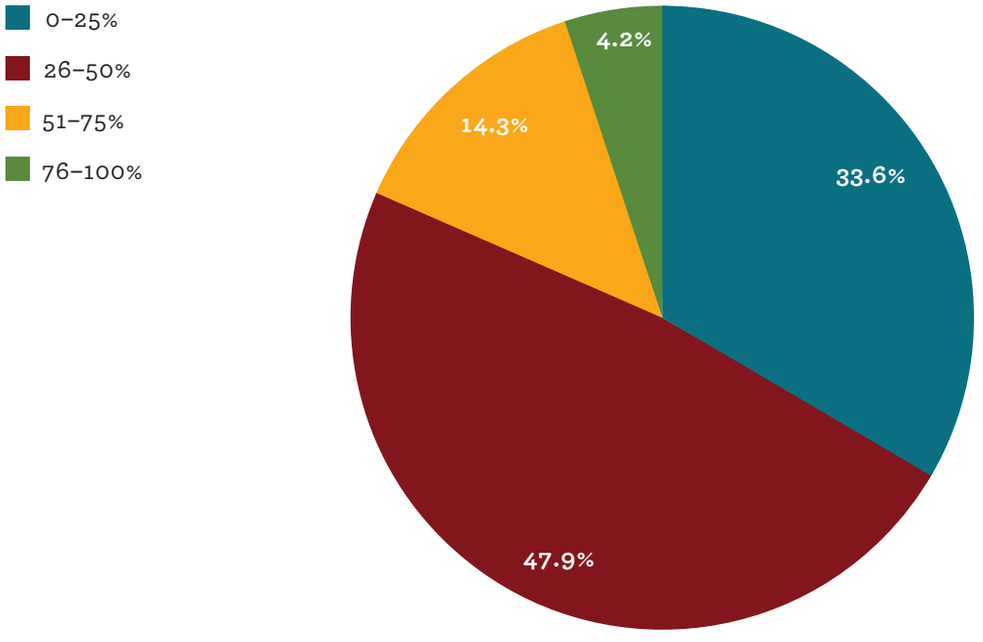

Figure 2.10: What percentage of student learning time is spent online weekly?

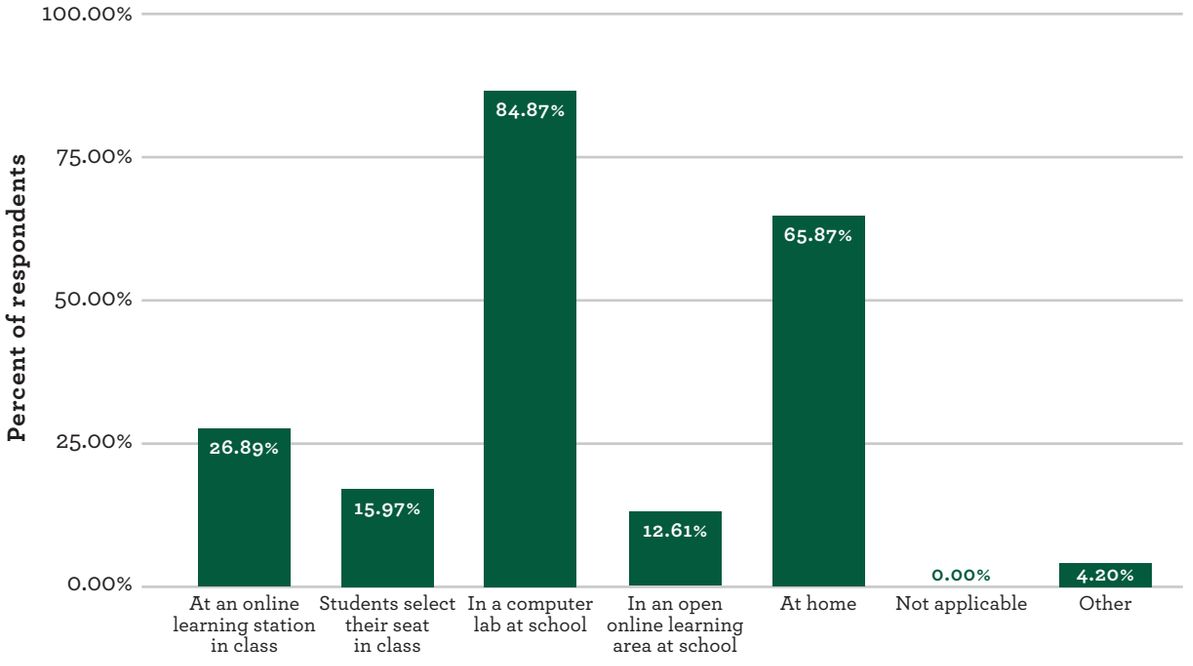

Figure 2.11: Where do students complete their online assignments?

In an optional free-response question, we gave respondents the chance to tell us how student learning has changed with the use of technology. One hundred thirteen respondents chose to answer this question; the most popular response was that technology has made it more interesting and fun for students to learn (47 percent). Respondents also mentioned that technology has increased quick and easy access to information (19 percent), while others noted that it is easier for students to collaborate and for them to comprehend material (13 percent each). Technology has also helped students focus more on their studies, allows for learning to be "anytime, anywhere," and aids students in being more independent in their learning (nine percent each).

The teacher's experience with technology

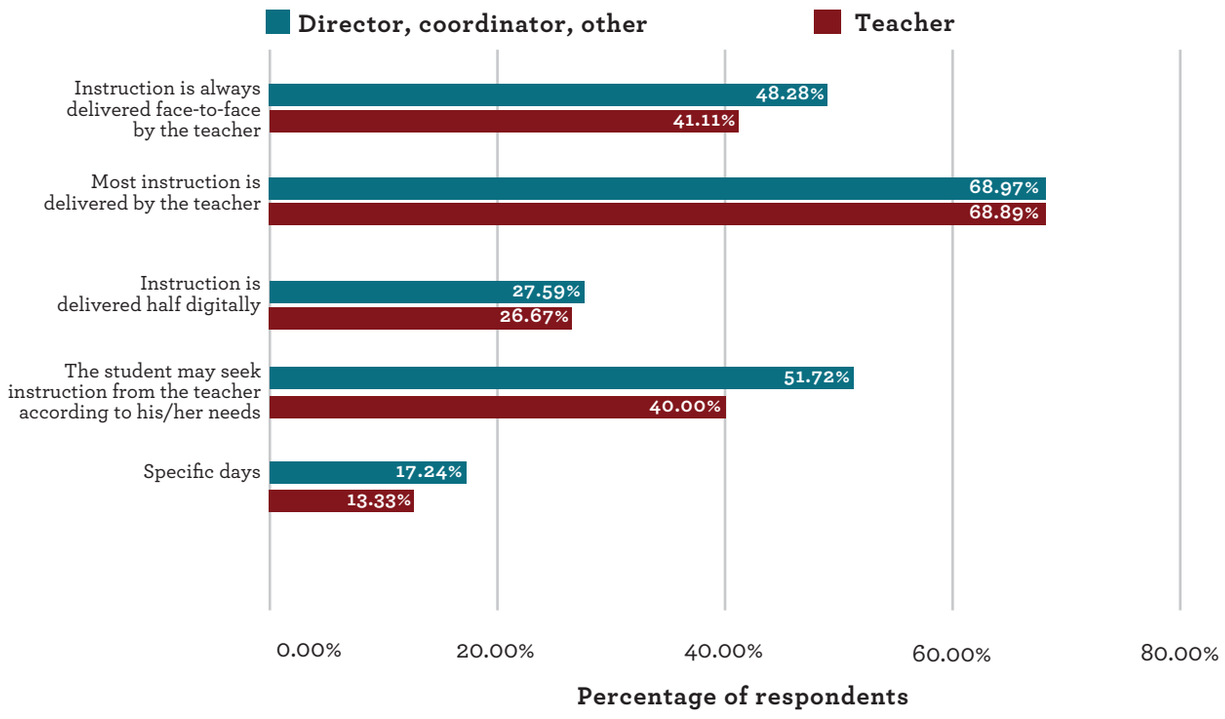

Figure 2.12: How often do you/teachers give face-to-face instruction?

More about your technology program

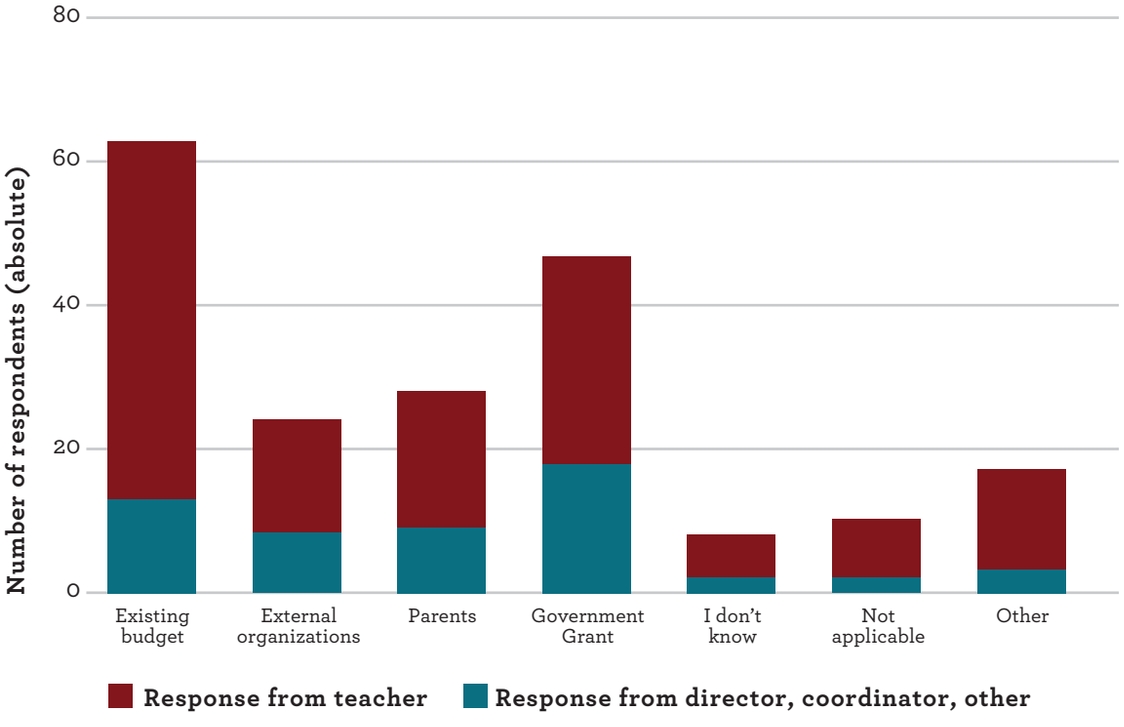

Figure 2.13: Where do you/your school get the funding for your technology?

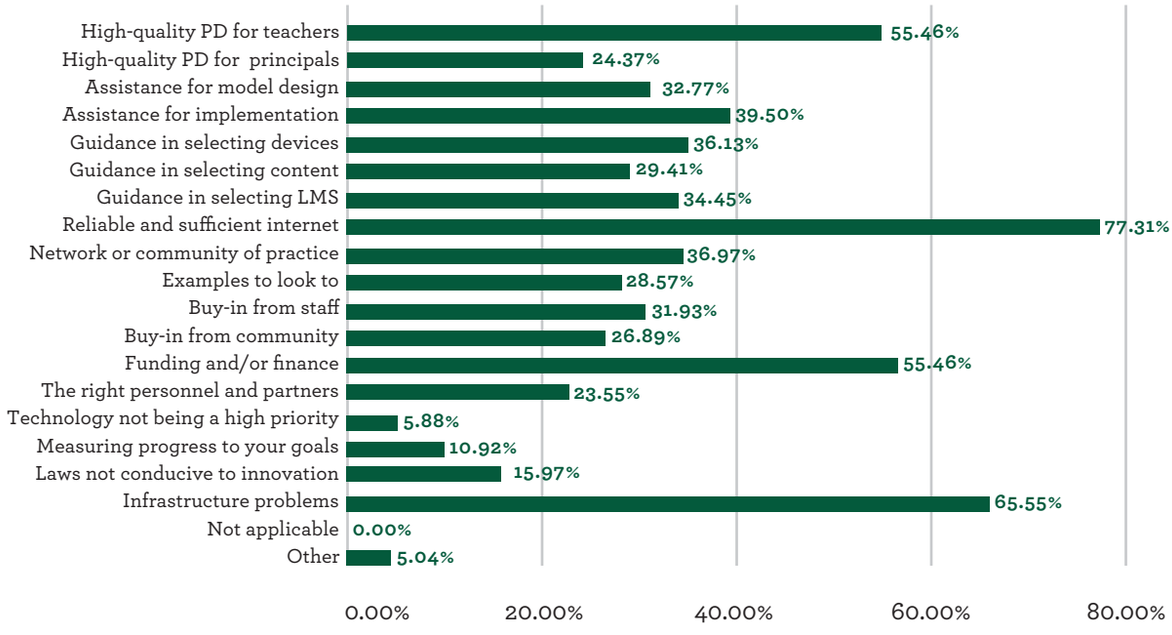

Figure 2.14: What are your key challenges when using technology?

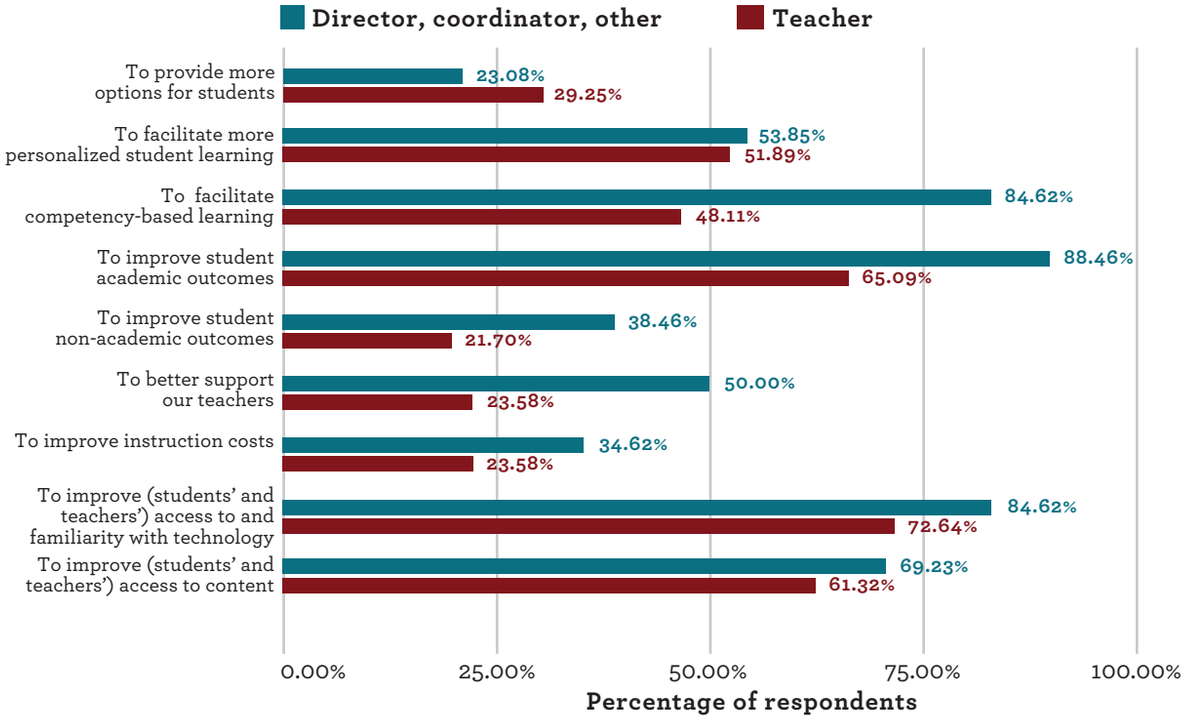

Figure 2.15: Why did you/your school decide to use technology?

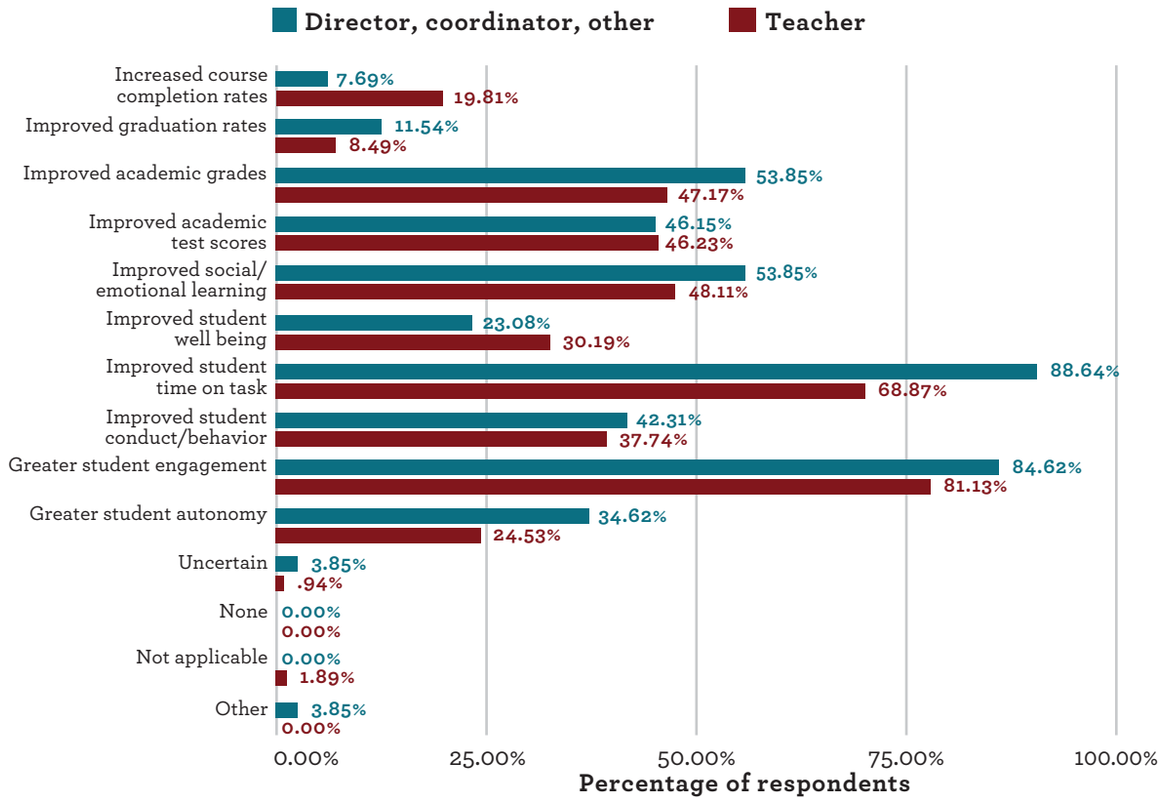

Figure 2.16: How do you/your school define student success while using technology?

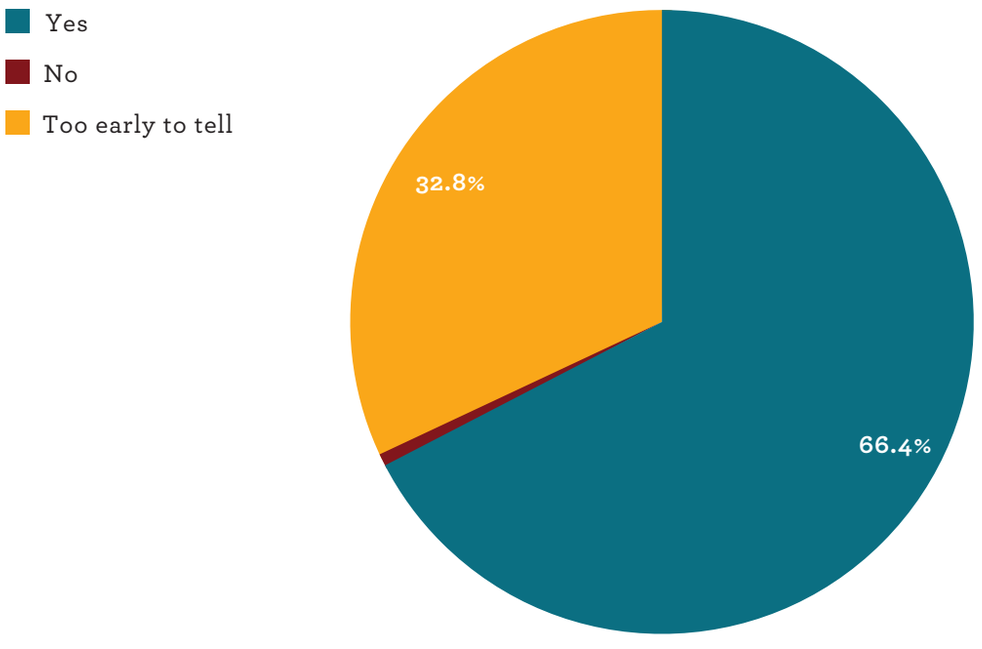

Figure 2.17: Has using technology produced the results you wanted?

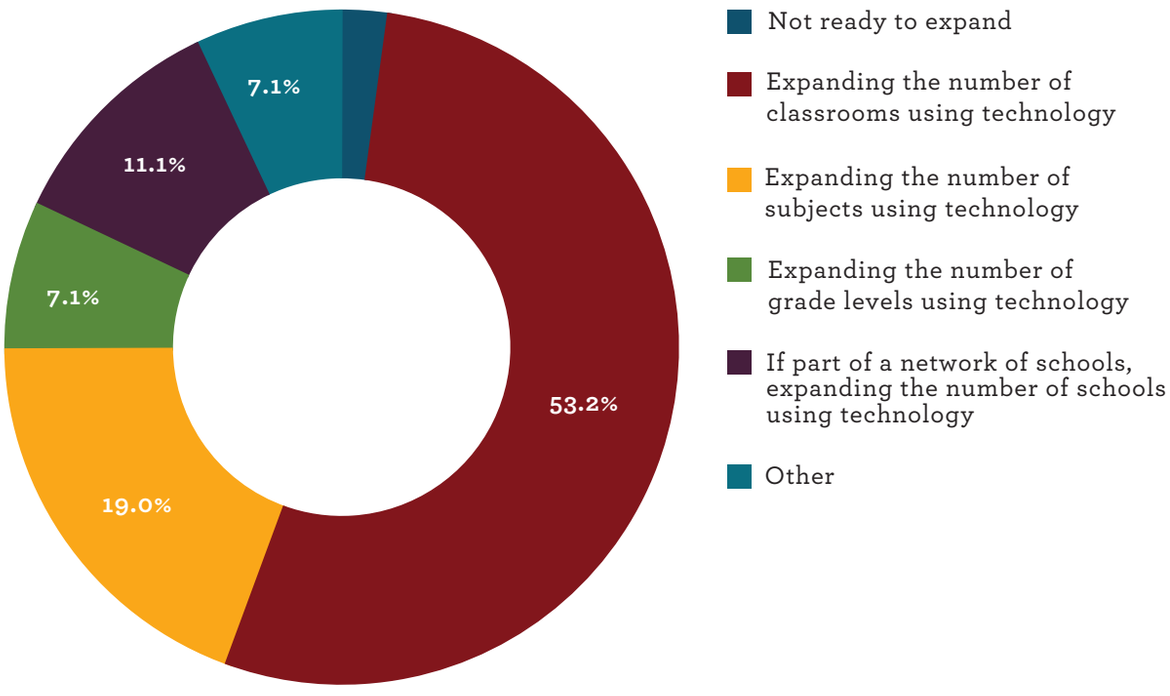

Figure 2.18: Do you/Does your school plan to scale technology efforts?

Analysis

1. Delineating tech-rich vs. blended models

Based on the survey and case study data, the most crucial distinction in the data consisted of a seemingly basic question: are schools deploying technology in a tech-rich model, a blended-learning model, or both? Given that the goal of our survey instrument and school visits was to identify the level and type of blended-learning activity occurring across Malaysia's public schools, the following analysis will provide observations and hypotheses regarding the distinction between tech-rich and blended-learning efforts afoot in the sample of schools that we surveyed and visited. Discussion of how the survey instrument might be improved in the future to better surface this distinction can be found in the paper's concluding remarks on survey methodology.

The data collected suggest that not all teachers and leaders who reported that they are "using technology" (over 90 percent of respondents) are specifically pursuing blended-learning models. Indeed, we identified a subset of the schools we visited (eight of 13, or 62 percent) to be blended. Among the five tech-rich schools that we observed in-person, they were actively using hardware and software yet teachers had not pivoted to using those tools to deliver online learning content to individual students in a manner that allowed students some control over path, pace, or place.

2. Gauging availability of content to support particular subject-area focus

According to the survey data, technology use was most prevalent in ICT (39 percent), English (35 percent), Malay (30 percent), math (27 percent), and science (24 percent). Using technology to support ICT coursework echoes the overwhelming 85 percent of administrators and 73 percent of educators who later in the survey identified "familiarizing teachers and students with technology" as a key goal of their school ICT initiatives. In other words, this subset of schools appear to be deploying technology in an effort to teach students about how to use technology.

Overall, this relatively consistent rate of core subject specific efforts may suggest that the survey reached a wide variety of subject-matter teachers and that variety of teachers is using technology to support a variety of subjects. However, based on our case studies, we hypothesize that across all subject areas, educators are still looking for better content. Discussions during our school visits in part confirmed that online content may be lacking to boost meaningful use of blended learning, especially in core, tested subjects. Specifically, a number of teachers noted that online content does not perfectly align with national tests, particularly the national D6 exam, which in turn discourages teachers from fully integrating online content. As a result, as one teacher put it during our school visits, "teachers have to choose between preparing for the [UPSR] exam or doing blended learning."

3. Leveraging computer labs and shifting instruction

According to both survey data and school visits, the use of computer labs is overwhelmingly common across Malaysian schools. In fact, 85 percent of survey respondents reported that students use technology in computer labs and all 13 schools that we visited had computer labs in use. This is in part due to the fact that the current government-led connectivity program identifies one room in the school (along with a teacher room and administration room) to be a computer lab with sufficient devices and internet connectivity.

Computer labs could be used to support a variety of blended-learning models. For example, students could access playlists of online content or take fully online courses from a computer lab. Based on our school visits, however, the lab rotation model—in which students rotate into a lab on a weekly or daily basis, and then experience face-to-face instruction back in their classrooms—was by far the most common use of lab space. Teachers who used the lab rotation model normally utilized the computers in such a way that they could easily identify student pain points (e.g. via individual or classroom-wide quizzes), which then went on to shape their non-tech lesson plans using some of that data.

4. Tracking platform access, usage, and blended-learning adoption

Given that all public schools across the country have access to the Frog VLE platform (including every school we visited in person), our findings suggest that adopting the platform alone does not constitute fully shifting to a blended-learning instructional model. As observed on school visits, the platform, can be used to organize traditional instruction or to administer assessments without integrating online content into students' learning experiences. That said, the platform itself is suited to blended-learning approaches. Some schools, highlighted as case studies in Appendix D, are using it to dynamically manage and distribute content such that students can access online learning in a flexible manner. Our survey data suggests, however, that other schools are not using the platform on a regular basis: only 47 percent mentioned the use of the Frog VLE when asked what specific software they use.

5. Tackling infrastructure challenges

According to both the overall survey and discussions during school visits, infrastructure, in particular internet connectivity, remains a core concern among educators and school leaders. An overwhelming 77 percent of respondents cited internet connectivity as a pain point in schools using technology. During our school visits, educators noted the internet concerns and pointed out other infrastructure challenges including insufficient or out-of-date hardware, and lack of reliable ICT supports or technicians. As one teacher put it, "The facilities and infrastructure are the most difficult part of having a blended program. The internet isn't always reliable, the classroom we use for the computer lab is very small, and all the computers besides the Chromebooks are old and secondhand." It is worth noting that the 1BestariNet project provides internet connectivity in only three locations in each school–the computer lab, the administration room, and the teacher's room–which may not be clear to teachers who wish to use the internet outside of those designated areas.

6. Specifying outcomes and metrics guiding technology integration

Over 66 percent of respondents reported that technology was accomplishing the results that they hoped it would. This shows a relatively high level of satisfaction with technology tools, and bodes well for Malaysia's overall ICT efforts. However, almost a third of respondents said it was "too early to tell" whether technology integration had produced the desired results. Moreover, educators during our school visits frequently referred to the key performance indicators (KPIs) that track technology usage as sometimes working at odds with helping the entire school take advantage of technology. As one teacher put it, "How do you make technology integration a culture and not something that you need just to hit KPIs?"

In addition, the fact that three-quarters of respondents identified "increasing teacher and student familiarity with technology" as a goal of using technology in their classrooms and schools suggests that implementation may linger in tech-rich models which can effectively familiarize students and teachers with technology without ever pivoting into a fully blended model. In other words, schools could theoretically be accomplishing this goal without integrating technology into instruction, which might in turn mean that investments in tech do not contribute to core subject learning outcomes. The relatively high rates of satisfaction with technology reported suggest that this may be the case.

Recommendations

Numerous variables, such as talent, funding and factors beyond the school walls, all inherently shape a blended model. Recommendations, therefore, are aimed at how schools trying to leverage technology might do so with greater success but are by no means meant to be comprehensive or exhaustive given the low survey response rates. We offer the following recommendations as suggestions and hypotheses that ought to be further considered in the broader national and regional context.

Pair platform investments with instructional model research, development, and metrics

Distinguishing tech-rich versus blended-learning efforts is especially crucial given Malaysia's countrywide commitment to ICT integration and whole-school Frog VLE implementation. This common platform could offer an efficient, centralized tool to spread blended-learning practices across a variety of schools. The platform, however, like any technology, will only be as effective as the instructional model that surrounds it. Schools and partner organizations should consider stepping back to rethink the instructional models that best fit their students needs and then implement the VLE to support those models—rather than retrofitting the platform to fit the needs of an existing, traditional, non-blended classroom model.

The metrics guiding platform and technology adoption will also shape the speed and efficacy of these efforts. Malaysia's usage indicator KPIs may be contributing to an emphasis on tech-rich rather than blended models. Although a useful output, usage metrics may not be providing educators with meaningful outcome data—that is, whether their efforts to integrate technology are leading to their stated goals (which, according to the survey, overwhelming include student engagement, grades, and test scores). Schools might overcome this by determining their own indicators to measure technology implementation relative to their own goals for their students. Both the survey data and school interviews also suggest that school officials might consider implementing interim measures that help educators to gauge whether their efforts to integrate technology are proving useful solutions to the problems they are hoping to solve.

Invest in blended-learning-specific professional development

Policymakers and school leaders should invest in professional development specific to blended learning. Over half (55 percent) of respondents cited professional development as a key challenge to integrating technology into schools, the third most common challenge after connectivity and infrastructure. To successfully adopt blended-learning programs, teachers need targeted opportunities to learn what blended learning is, to see examples of possible blended-learning models they might adopt, and to be given opportunities to pursue their own innovative models from the ground up (Mekhitarian, 2016). Effective blended-learning professional development, in other words, goes beyond just training teachers on a particular technology tool (Freeland and Hernandez, 2014). As one teacher at a school we visited put it, "teachers need guidance in all areas of program implementation—not just ICT training—in order to help students best."

Professional development experiences should also be grounded in the understanding that transforming the traditional classroom is no easy feat, and that communities of professionals learning together can create a productive, safe space to explore new instructional models. As one teacher told us, "As a teacher, you're used to being the one who knows everything. When starting out with blended learning, you won't know everything, so it's important to not be ashamed to ask for help and learn from other teachers and even the students."

Design models with infrastructure constraints in mind

In addition to investing in professional learning, developing new models must of course take into close consideration local context and constraints. Basic infrastructure challenges can make implementing a blended program daunting. The data suggests that policymakers should continue to invest in whole-school infrastructure and connectivity.

In the meantime however, schools hoping to pursue blended-learning models should consider designing those models with infrastructure constraints in mind, rather than viewing those constraints as prohibitive to pursuing blended learning at all. For example, some models that we studied, such as station rotation or lab rotation models, can be implemented without a comprehensive overhaul of hardware and require less bandwidth than models in which all students are working online at once. Additionally, software that can operate through desktop applications and/or mobile phones (rather than merely cloud-based applications used on laptops) could offer schools with poor connectivity a viable alternative, without sacrificing blended-learning opportunities full stop.

Ensure that data from learning labs is shaping classroom practice

A lab rotation model may offer a promising blended-learning approach to schools with limited hardware or space with which to innovate. If schools are pursuing a lab rotation model however, the learning that occurs in the lab needs to be deliberately integrated into instructional practices beyond the lab—typically through the careful use of data created through lab-based online courses or modules.[21] Among those schools committed to using labs—either for logistical, connectivity, or scheduling reasons—educators should investigate whether and how data from learning activities inside the lab feeds into offline activities throughout the school day. Additionally, rather than using the lab as they would a traditional classroom, teachers should consider using the lab space for allowing students to move at a more flexible pace than their traditional classrooms allow them to. Otherwise lab-based learning risks churning students through rote online activities occurring in isolation from other classroom-based instruction, in turn creating a missed opportunity to pursue a blended model.

Address gaps in aligned content

Ensuring that schools have access to a wider array of exam-aligned content might go a long way toward moving more schools into blended-learning models, across more subject areas. School officials and the Ministry of Education should continue to seek out specific, high-leverage gaps in aligned online-learning content. These efforts might target broader strategic goals, including but not limited to, subject areas in which students' current test results are lagging, subjects or grade levels in which there is wide variation among student mastery levels (making differentiation more challenging) or subject areas in which teacher talent is more difficult to recruit. One-time investments in more aligned content creation can pay dividends, lending scale to blended-learning efforts. As one educator at a school we visited said, "after selecting the content once, teachers are able to use it again and again and even share it with other teachers, allowing time savings week over week and year over year."

21. "The Lab rotation Model," Khan Academy, Available for Download: https://www.khanacademy.org/resources/using-technology-in-the-classroom/four-different-blended-learning-models/v/sscc-blended-lab.

South Africa

Basic education at a glance

30,500 public and registered independent (private) schools

4.1 percent of learners are in private schools

12.5 million learners

400,000 teachers

Learner-to-educator ratio in ordinary schools: 29.8:1

41.7 percent of the total population has completed an education of high school or higher (Department of Basic Education, 2012)

The South African education system is no stranger to transformation. The system underwent its most significant shift in 1994 with the end of apartheid. The system, once racially segregated under apartheid, combined in 1994 to form one system comprised of nine provincial departments and a single national department, the Department of Basic Education (DBE) (Mouton et al., 2012). Despite improvements in access to education for all races since this unification process, prevailing racial, socioeconomic and even linguistic divisions still pose major barriers to educational opportunity. The country spends a high proportion of its GDP on education (about five percent) in comparison to other countries, however student outcomes lag far behind its counterparts. In a 2015 report by the OECD, South Africa's education system was ranked the second worst among 76 countries (Hanushek and Woessmann, 2015).

The model of education in South Africa is rooted in the traditional, western factory-style progression. Primary and lower secondary education is compulsory. Public education by far serves the majority of South Africa's children, though families must pay annual enrollment fees to their children's school. That being said, the percentage of learners exempt from paying school fees, primarily in schools serving high-poverty populations, has risen significantly over the past decade, reaching 65.4 percent in 2014 ("More children", 2015).

The centralized, national curriculum for grades R ("reception") through 12 is known as the Curriculum and Assessment Policy Statement (CAPS). Despite curriculum uniformity, the reality for many of the 12.5 million learners in the country is an inequitable distribution of quality learning, due to a range of variables, including under-trained teachers,[22] high rates of poverty and anguage barriers to learning.[23] Of the approximately one million learners who started grade 1 in 2003, only 49 percent made it to matric in 2014, 37 percent passed, and 14 percent qualified for university entrance (Hall, 2016).

22. Teacher competence encompasses teachers' subject, curriculum and pedagogical knowledge. In some regions, calls for greater accountability in schools—from allowing school inspection, to testing the content knowledge of teachers, and declaring teaching an essential service—are all met with resistance from powerful teachers' unions. In other cases, particularly in rural areas, high-quality teacher training simply is not available and teacher content knowledge is often reported to be low. Unfortunately, the public school system does not track teacher performance nor hold schools accountable for poor student performance. (Raab and Terway, 2010).

23. In South Africa, there are 11 official national languages. National education policy allows for school discretion to teach and learn in the language(s) voted for by the parents in their community (Department of Basic Education, 1997). The language of instruction then is often either the home language of the majority of the student population, or many times, English, as parents view it as key to their children's opportunity for social mobility. A common problem, though, is when schools cannot provide sufficient second language learning supports, language barriers pose critical challenges to student learning.

There is also a stark difference between academic success rates of black students and white students. According to the South Africa Institute of Race Relations, of the students who stay in school long enough to reach their graduation exam, or matric, just two-thirds of black students pass the exam, compared to 99 percent of white students. Additionally, 59 percent of South African youth live in poverty, a critical factor affecting school retention and completion rates (Shezi, 2016). A 2010 USAID study on South African public school fees found that, in part exacerbated by the fee-based system, a community's wealth or poverty directly affects the quality of schooling, thus perpetuating historical inequalities that the country has fought long and hard to overcome (Raab and Terway, 2010). In many provinces, graduation rates are falling despite the fact that government has eased standards to complete high school in recent years. In fact, students need only 30 percent to 'pass' some subjects (Hall, 2016).

While many observers deem the education system in crisis, there are growing bright spots in the education landscape, spurred by grassroots reform movements and education innovations that have an urgent purpose and critical value-add for millions of underserved students (Spaull, 2013). Along with numerous challenges for education in South Africa come key opportunities to once again restructure and revitalize the system. For one, the government continues to assert education as the country's number one priority.

Technology is also on the rise. South Africa first enacted policy regarding ICT in education in 1995, launching Technology Enhanced Learning Initiatives. In 2004, the government released the e-Education White Paper, which aimed at making every student ICT literate by 2013. Under this plan, all schools would have ICT resources in teaching and learning for all teachers and students (Isaacs, 2007). The DBE's 2013-2025 E-Education Implementation Strategy plans on extensive professional development in ICTs for teachers and ensuring internet connectivity in every school as means to improve the quality of teaching and learning in public education (Department of Basic Education, 2012). As of 2016, the DBE's goals for ICT integration are focused on reducing the digital divide in South Africa, with the next phases of internet rollout across schools zeroed in specifically on rural, high-poverty areas (Department of Basic Education, 2016).

Among these efforts to improve the education system, educators and leaders are exploring new ways to integrate technology into instruction. Although the majority of public schools (six out of ten) did not have basic computer labs in 2016, the use of computers and educational technology in schools is expected to continue increasing (Shezi, 2017). In some regions, policy is leading the way. One of the nation's provinces, Gauteng, launched the "paperless classroom" program in 2015. With this initiative, the provincial government pledged to replace all traditional textbooks by supplying the province's 3,000 schools with internet, tablets and smartboards. The endeavor holds promise to reduce inequities in access to learning resources, but the government has faced setbacks to the roll-out such as prevalent theft of devices from schools

(Gedye, 2016). At the same time, a small but expanding number of private, or independent, schools are investigating new educational models, finding new ways to reduce student fees, enhance teacher quality, and better meet the needs of traditionally underserved, low-income students in South Africa.

In other regions, however, the cost of the technology roll-out inhibits its scalability. Schools in rural provinces, for example, face more basic infrastructural challenges such as lack of proper restroom facilities or electricity. Still, even in these regions, the rise in use of simple, inexpensive technologies like mobile phones and learning apps in particular present the chance for teachers and students to gain knowledge beyond traditional training and the national CAPS curriculum, and even offer a new means to effectively address language differences, uneven resource allocation, and student disengagement. In rural areas where quality, trained teachers are scarce, such technologies could be an important component in efforts to improve the quality of instruction.

Partnerships & Survey Methodology

In order to distribute our survey to public school educators and administrators, we partnered with JET Education Services, a nonprofit research and development firm, and the South African Department of Basic Education (DBE). The DBE granted us permission to send the survey to public schools across the country and provided us with a sample of 1,274 schools (drawn from over 25,000 schools countrywide), all of which had previously reported internet connectivity to the DBE. Together with JET, we emailed those schools directly, inviting them to participate in our survey for a chance to win a copy of Blended: Using Disruptive Innovation to Improve Schools. When the response rate was low following four emails, JET's team began calling schools by phone to request their participation. The calls reminded the head of school or a school administrator of the survey email and asked them to complete the survey the same day. A total of five emails were sent to all schools. Additionally, JET made a total of 962 phone calls to individual schools. We first distributed the survey on May 5 and closed the survey on July 7.[24]

Before analyzing the data collected from the survey, we would like to explain a few implicit biases that will shape our sample. First, because of the sample provided to us by the DBE, the public schools surveyed were those who had already indicated access to the internet connectivity, which skews the sample in favor of schools already inclined to deploy technology. Furthermore, because we shared the survey link through email and social media pages, we only have responses from individuals who already have some sort of connectivity to the internet and technology (at home or at school). Therefore,

24. We attempted to gather survey data on the private school sector as well. We requested a partnership with the Independent Schools Association of South Africa, however, they were not open to channeling external surveys to their member schools at that time. We also spoke with several independent, educational organizations and edtech providers in South Africa to explore a survey partnership. As a result of this outreach, we partnered with SchoolNet South Africa, a non-governmental organization focused on ICT integration in education. They shared a survey invitation twice on their Twitter page with 6,360 followers and included the survey link in their May and June monthly newsletters with 2,072 subscribers. We received a total of just 9 complete responses from private schools from this survey. Given the very low response rate, we will not include that data here, but strongly recommend private school surveys as a promising area for further research.

this dataset will exclude those who do not use email for educational purposes, as well as those who do not access to hardware and/or the internet. Further research may wish to attempt paper-based survey distribution.

There was an exceedingly low return rate on the survey. We suspect that the low response rate may be indicative of a lagging communication web within the education system, and future studies may consider distributing a paper-based survey in addition to an online survey. Another possible reason for the scant responses may be South African educators' unfamiliarity with the brand of the Christensen Institute, which we attempted to alleviate by distributing the survey alongside JET and under the approval of the DBE.

Perhaps due to some of these factors, we received a total of 58 completed responses to the public school survey. Seventeen additional responses were started, but not completed.[25] Finally, at the beginning of the survey we asked respondents, "Do you/Does your school use online learning in some way? Meaning, some or all of the instruction takes place using internet connected hardware/software?" Out of the 58 total responses, 24 noted that their school did not use technology. We have controlled the data below by including data only from respondents who affirmed that their school uses technology in some way. In other words, the graphs below summarize the data from 34 completed responses from public, primary and secondary schools that are using technology for teaching and learning.

In addition to gathering survey responses, to get a more in-depth view of schools using digital or blended learning in South Africa, we visited 14 schools all of which indicated that they were using technology in their school to some degree, or were recommended to us by contacts in the country. We learned of four of these 14 schools through the survey, and the rest from partners and our own research. The 14 schools were selected with consideration for some geographic diversity; they were rural, suburban and urban schools located across the provinces of the Western Cape, KwaZulu Natal and Gauteng. They were also a mix of seven public and seven private schools.[26] Of the 14 schools visited, we determined that four public and six private schools were using blended-learning models. The other four were tech-rich models, which we will discuss further in the discussion to follow. Summaries of these ten blended schools can be found in *Appendix E*.

25. See footnote 12 for a discussion of incomplete responses.

26. While the broader survey responses do not reflect the private school sector, and private schools only represent a fraction of schools in the country, we decided to include private schools in our visits because we were aware that with their typically larger bank of resources and a stronger community of practice, private schools could provide valuable insights into the range of blended efforts getting off the ground in the country. Also, due to delays beyond our control in distributing the public school survey and the subsequent low response rate, we included private school practitioners in the case studies as well.

Data Summary

Tell us about yourself and your school

Public school respondents represented a large swath of South Africa; these schools came from all nine provinces in the country. The pool of respondents, however, is not generalizable to either the 1274 schools contacted or the population of all schools in the country.

Figure 3.1: Map of survey respondents in South Africa

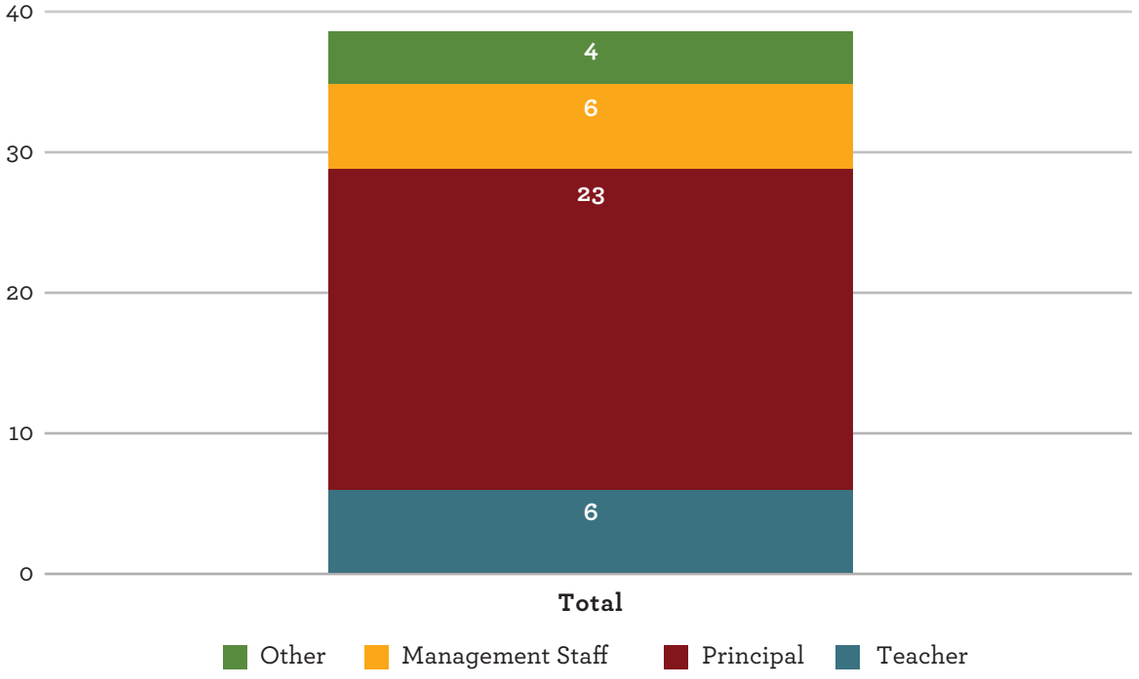

Figure 3.2: Respondent job titles

How are you using technology?

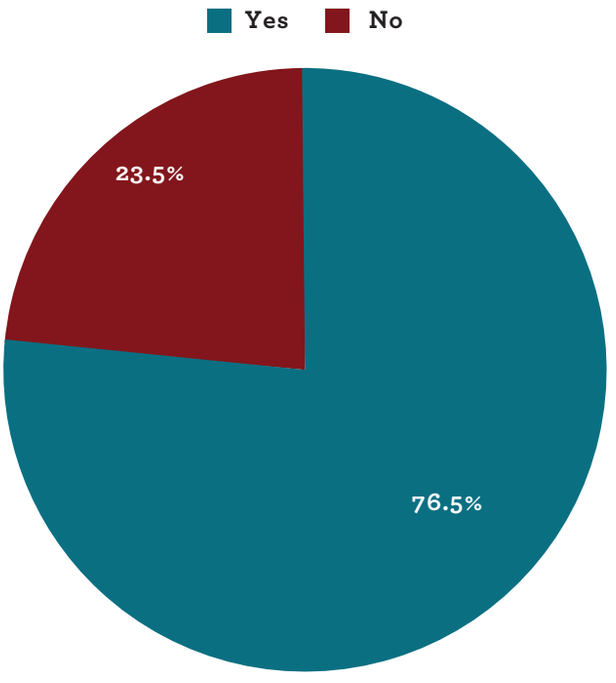

Figure 3.3: Are online and offline activities connected in some way?

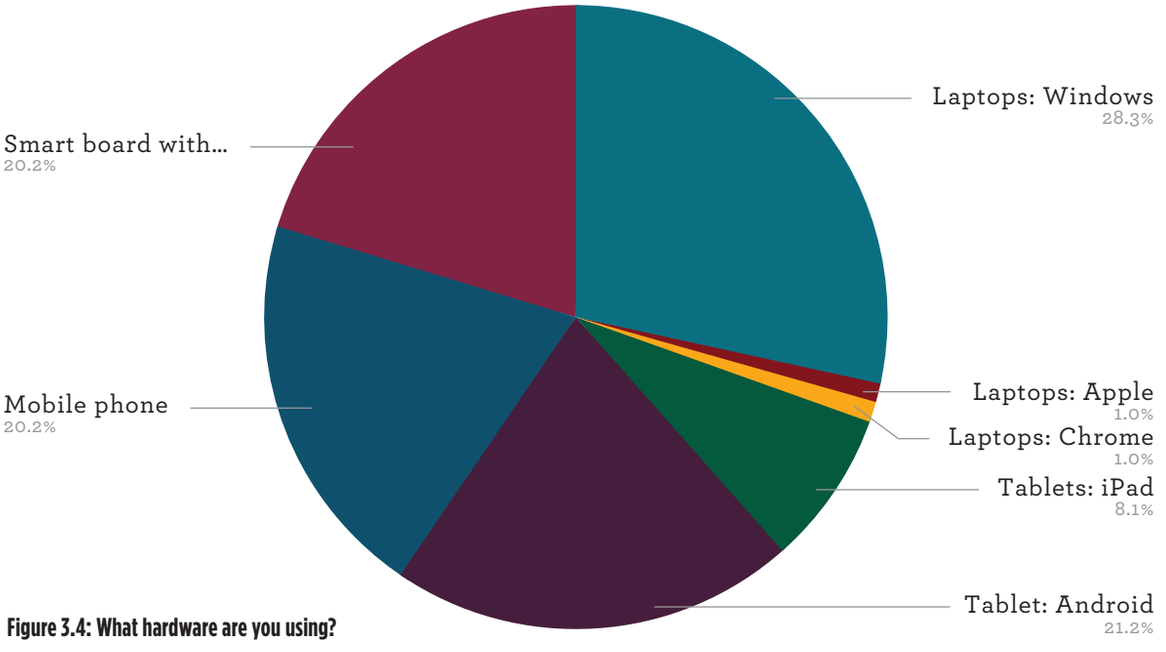

Figure 3.4: What hardware are you using?

Figure 3.5: What software are you using?

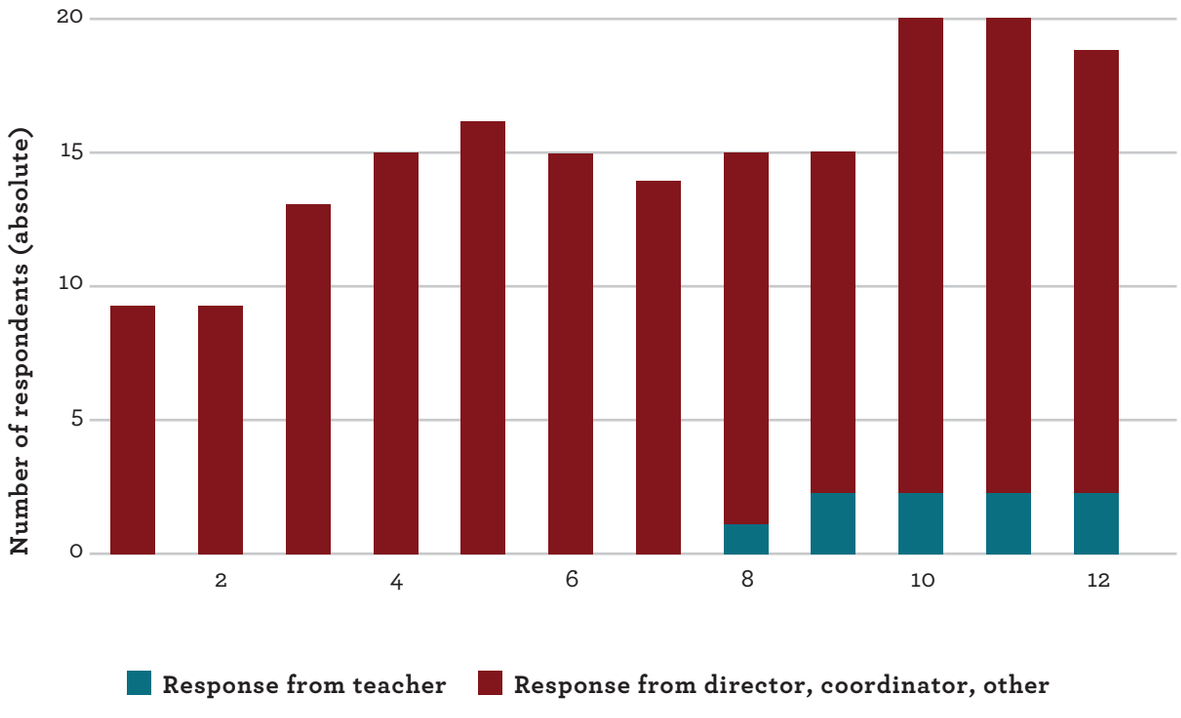

Figure 3.6: What grade levels [do you teach that] are using technology?

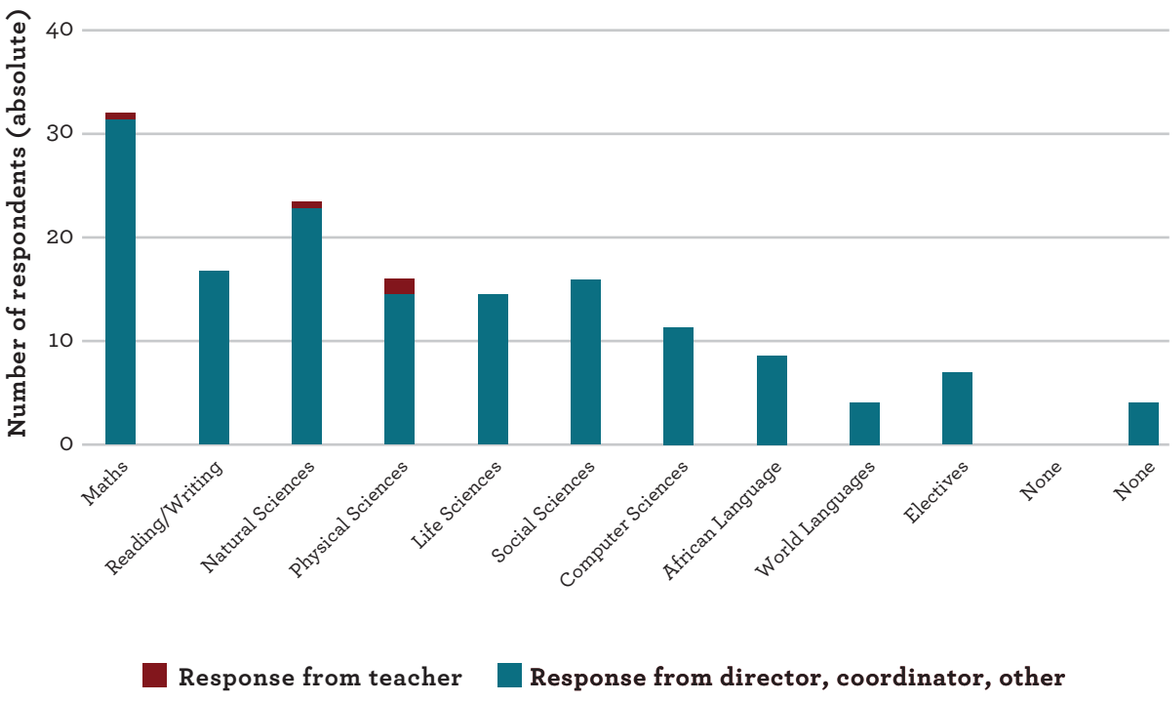

Figure 3.7: What subjects [do you teach that] are using technology?

The student's experience with technology

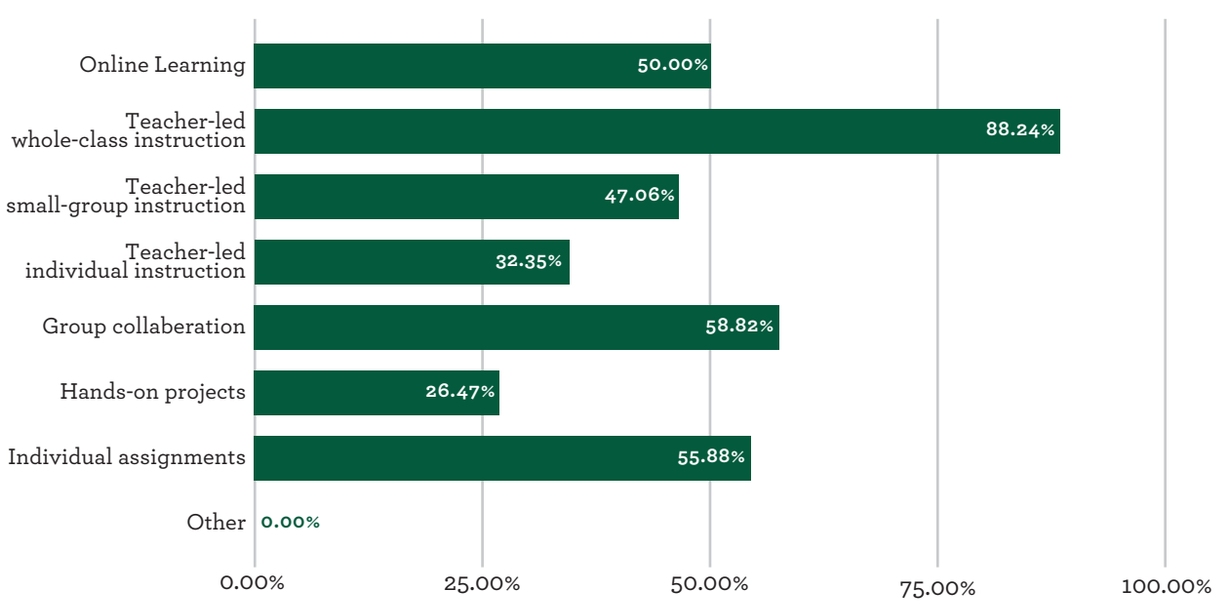

Figure 3.8: What types of learning does a student engage with in a typical week?

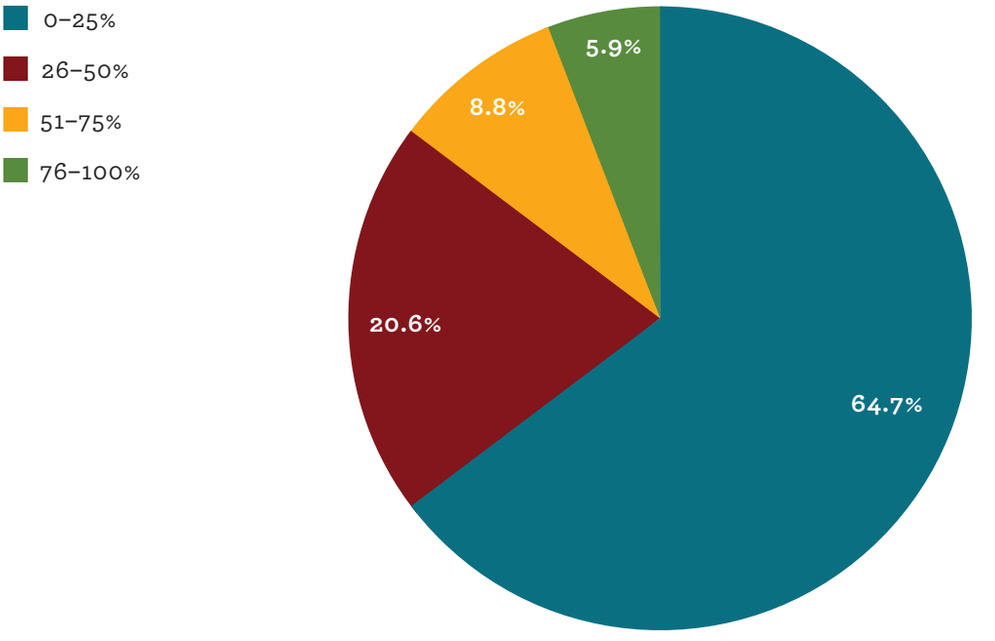

Figure 3.9: What percentage of student learning time is spent online weekly?

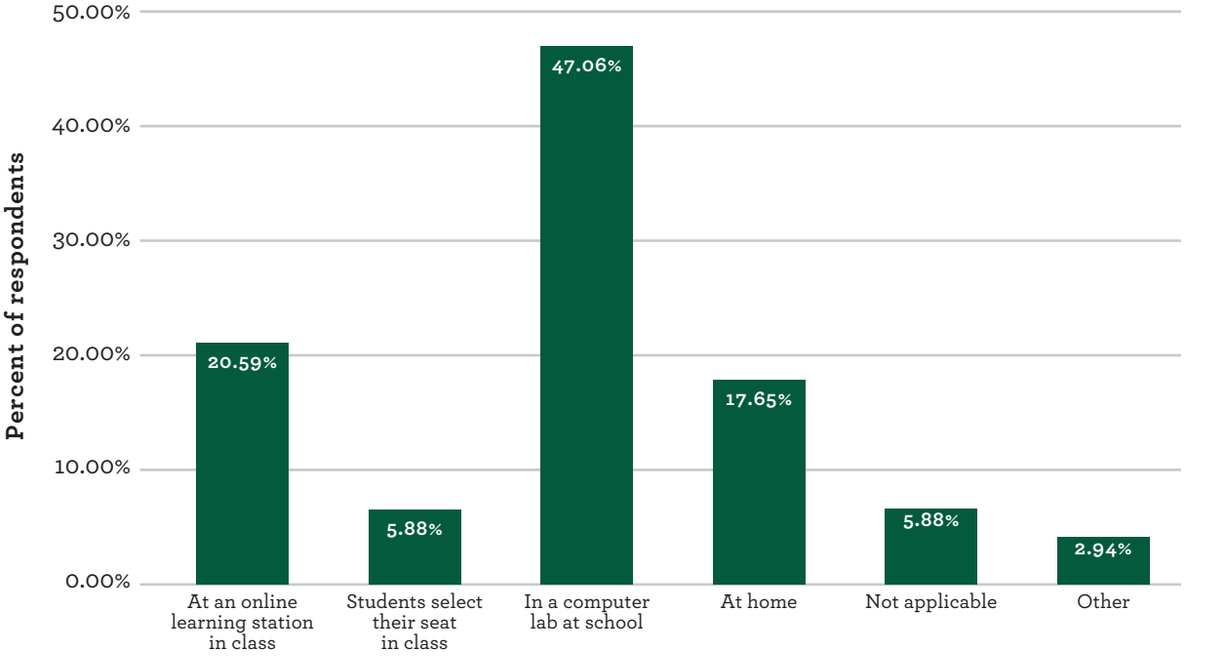

Figure 3.10: Where do students complete their online assignments?

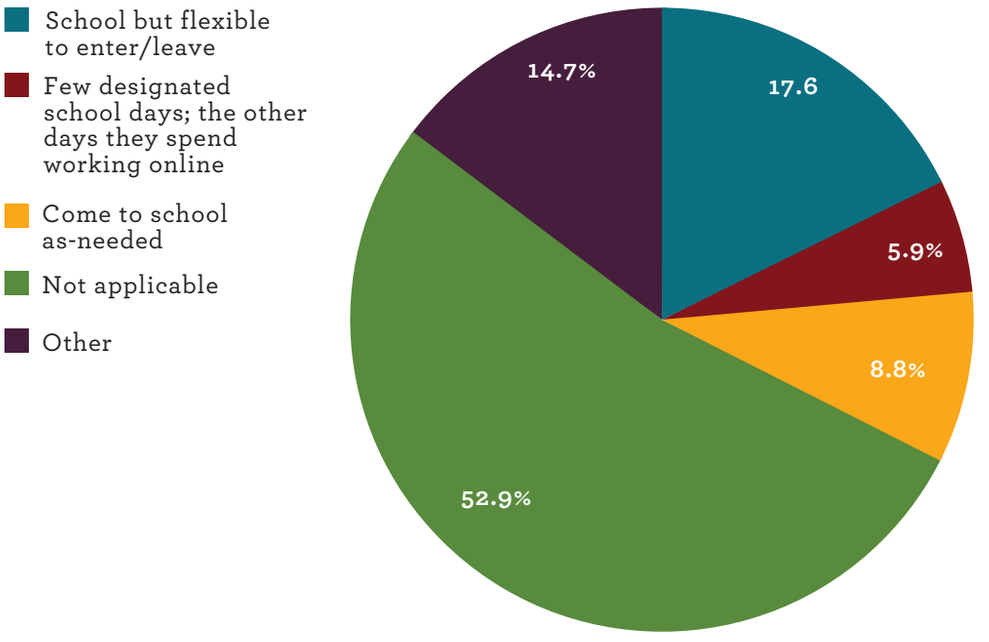

Figure 3.11: For students in classes where both digital learning platforms and a teacher are used for instruction, how many days a week do they typically spend at school?

In an additional, optional free-response question, we gave respondents the chance to tell us how student learning has changed with the use of technology. Twenty educators chose to answer this question, and the most frequently cited ideas were that using technology has increased student interest and engagement in their learning (33 percent), helped students to develop technology skills (19 percent) and increased their academic performance (15 percent). Others also mentioned that technology has helped to "close the digital divide" (11 percent), increased student autonomy (seven percent), and made teaching and learning easy and efficient (seven percent).

The teacher's experience with technology

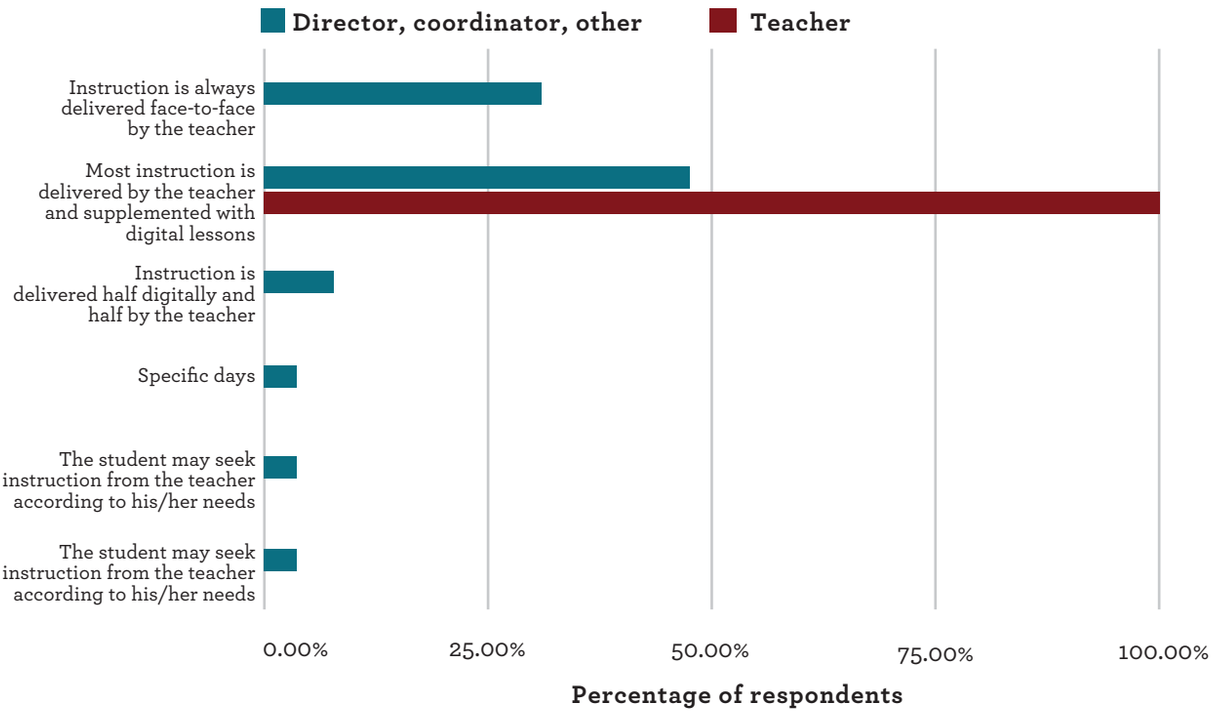

Figure 3.12: How often do you/teachers give face-to-face instruction?

More about your technology program

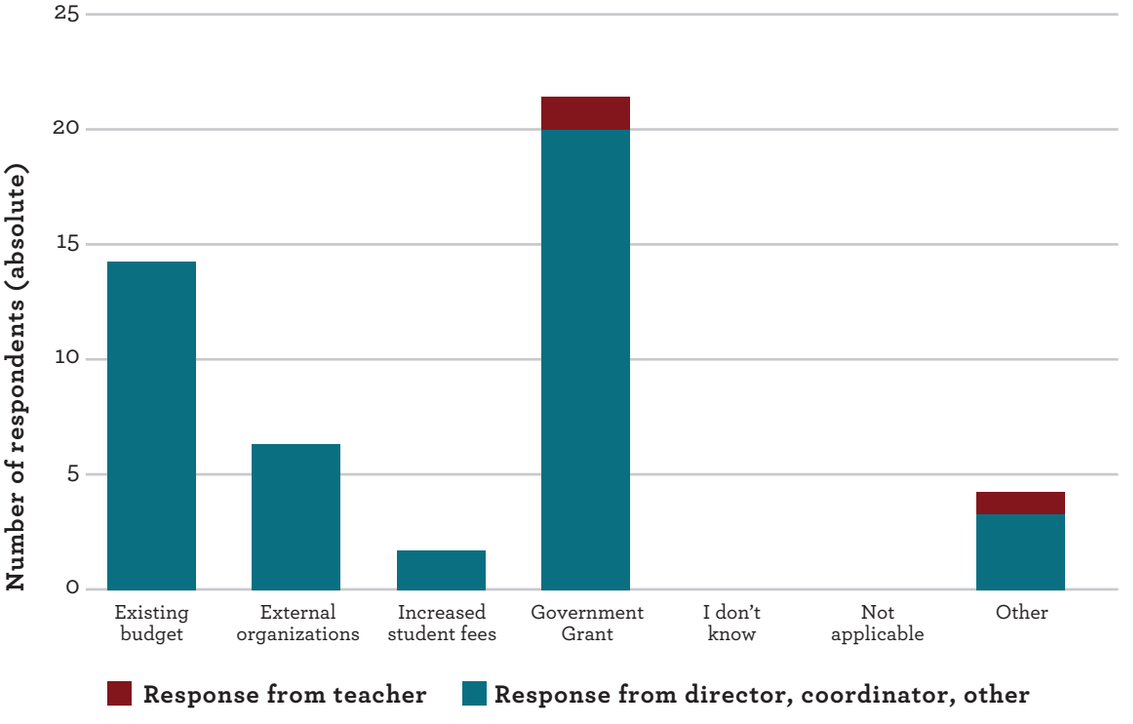

Figure 3.13: Where do you/your school get the funding for your technology?

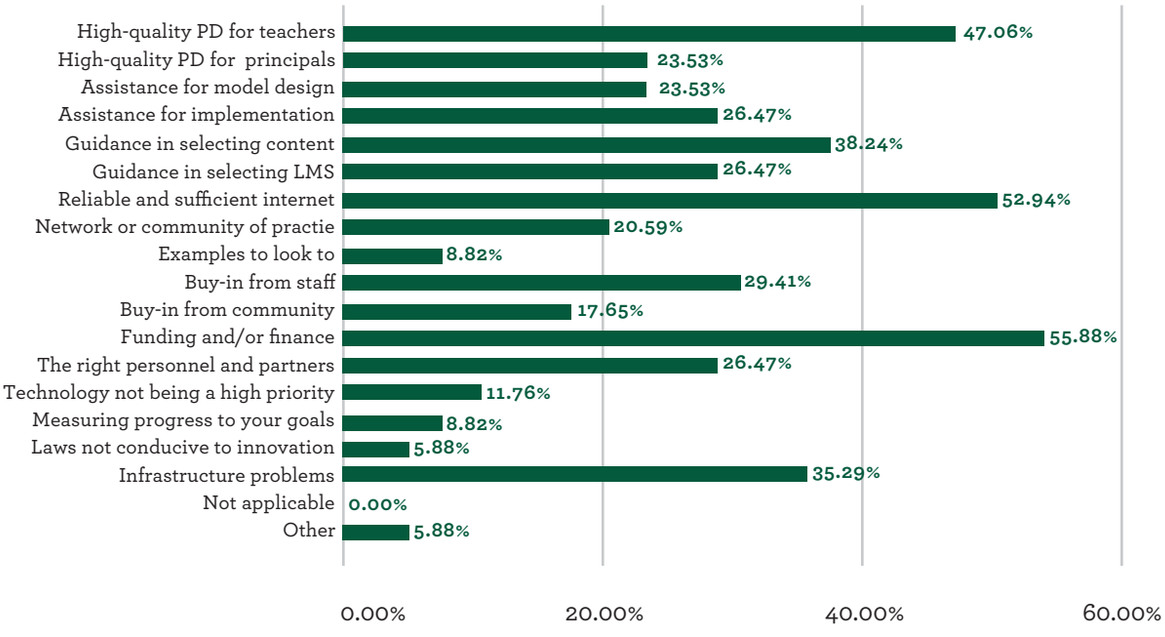

Figure 3.14: What are your key challenges when using technology?

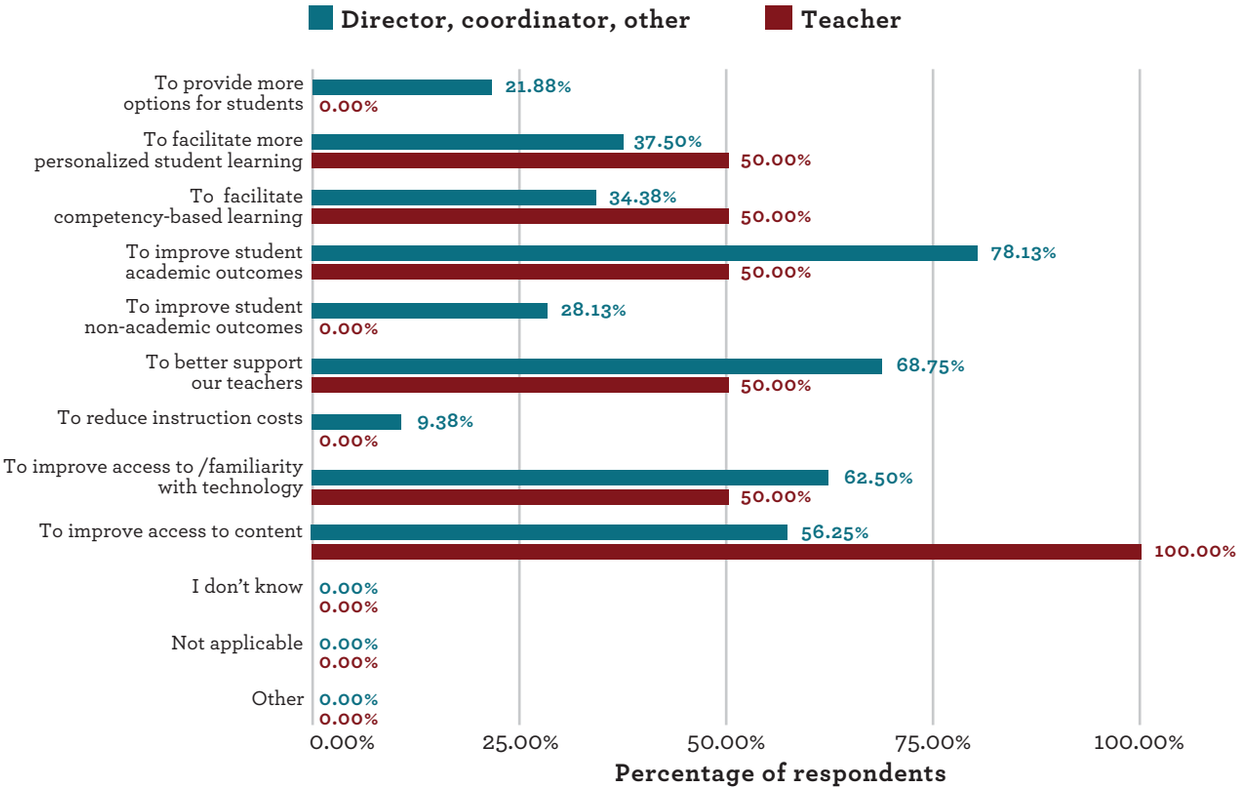

Figure 3.15: Why did you/your school decide to use technology?

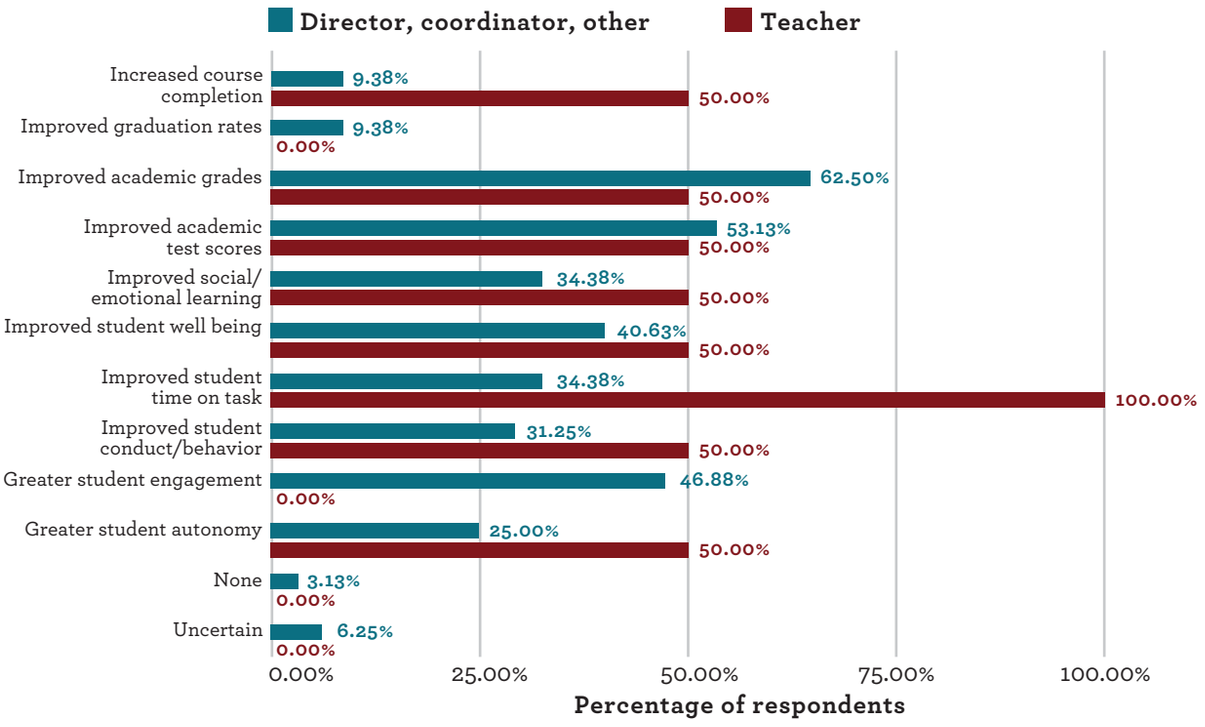

Figure 3.16: How do you/your school define student success while using technology?

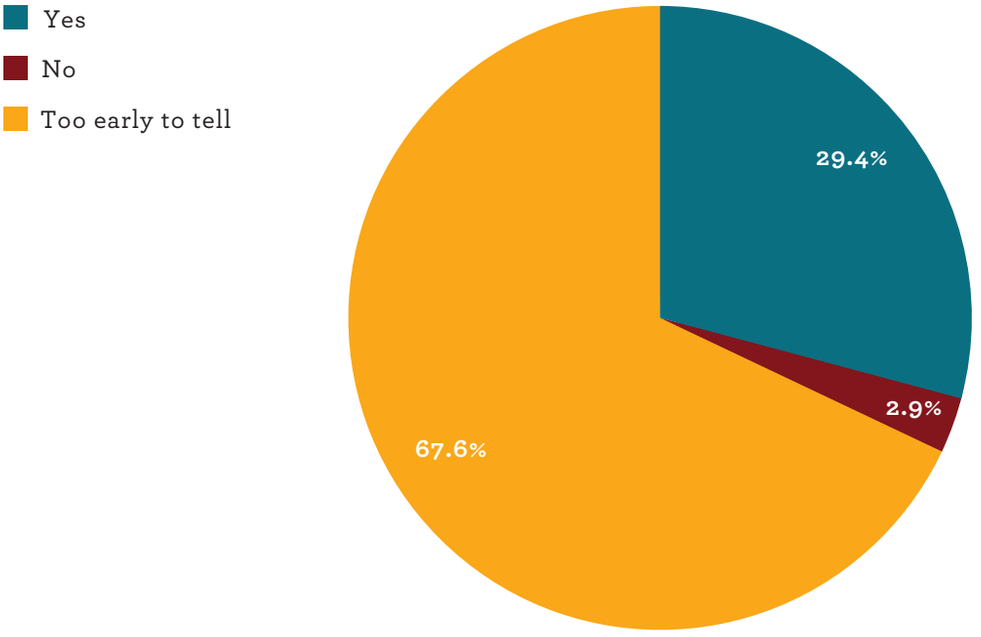

Figure 3.17: Has using technology produced the results you wanted?

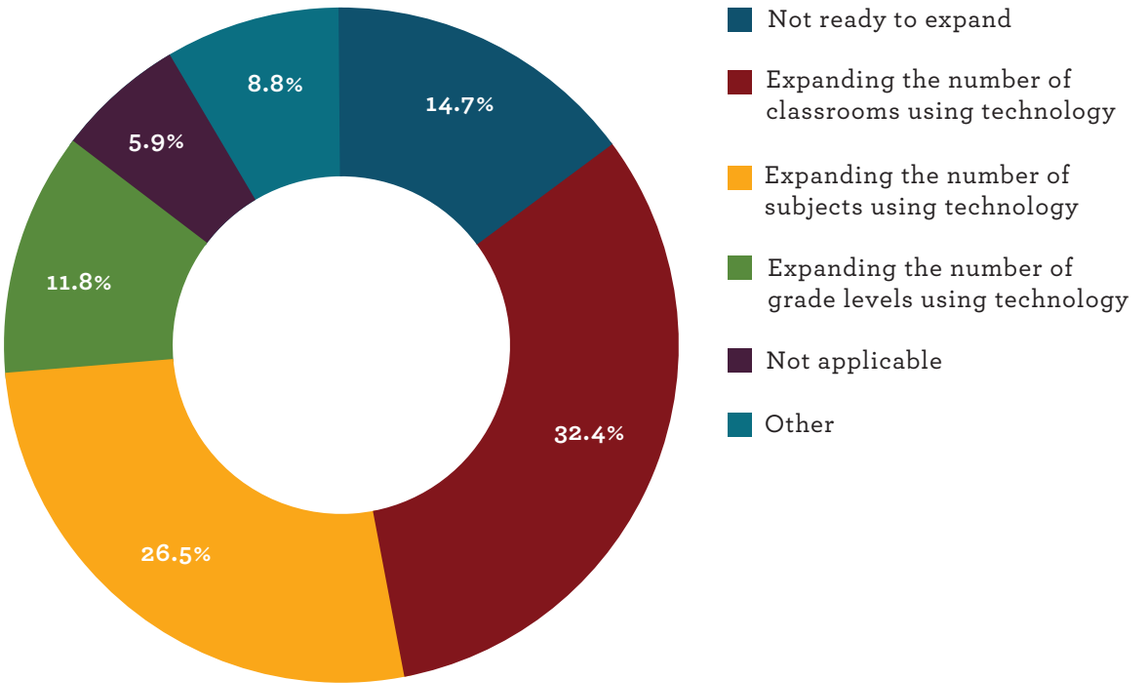

Figure 3.18: Do you/Does your school plan to scale technology efforts?

Analysis

1. Integrating digital learning and face-to-face instruction

A significant number of respondents (41 percent) reported that they were not using online learning at all. Recall that our sample from the DBE came from a list of schools that reportedly have internet connectivity. This means that even among those schools with some connectivity, online learning is not necessarily occurring.

Out of the 59 percent of respondents that indicated their school used online learning, 76 percent said that online and offline learning are connected in some way, which indicates that that subset of schools are moving in a blended direction. That said, only 50 percent of respondents reported that students engage in digital learning "each week." This suggests that schools may be offering some online learning, but not on an entirely regular basis for most or all students. In the remaining schools that reported using online learning but not connecting online and offline learning, we hypothesize that teachers are likely struggling to access and use data out of online activities to shape offline lesson planning and instruction, due to connectivity, software, or time constraints. Time may be particularly scarce given that classes in South Africa's government schools are typically overcrowded. At a few of the public schools we visited, for example, the average class size is about 60 students. In theory technology could alleviate some of these logistics, but would require that teachers shift to using their time differently, rather than simply adding data to their existing load.

2. Aligning online curriculum to core subjects

Among the public schools surveyed, math ranks the most popular subject for integrating technology. A total of 94 percent of respondents said they used technology in math classes. In contrast, 74 percent use technology for natural science and just over 50 percent use technology for reading and writing.

We hypothesize that this breakdown may reflect the particular limitations that the national curriculum poses to integrating technology across more subjects. Some schools that we visited noted that blended learning is inherently bound in South Africa because of time restraints built into the CAPS curriculum. At a private school in the Western Cape, for example, the leadership said that it is difficult to leverage blended learning alongside the national curriculum because teachers cannot give students greater degrees of control over the pace and timing of their learning if they hope to remain on track with the curriculum. For math, however, there is a wider supply of CAPS-aligned math learning apps in South Africa. Companies with countrywide reach like Siyavula and Rethink Education, as well as nonprofits that support schools to implement edtech such as The Reach Trust and the Click Foundation, have all launched with a specific math focus.

3. Building basic infrastructure

Among survey respondents using online learning, 53 percent reported that reliable and sufficient internet connectivity is one of their key challenges to using digital learning, and 35 percent of respondents reported that infrastructure problems more broadly posed challenges.

Wi-fi connectivity can be an ongoing issue for many public and private schools. Moving forward, fiber likely may be needed to make internet use more reliable, but for the moment it is prohibitively expensive for a majority of schools. This can frustrate blended efforts. For example, in two rural schools that we visited in KwaZulu Natal, students have access to tablets, laptops and a computer lab as well as digital projectors. However the teachers report often facing connectivity issues when they try to use them in the classroom. As a result, most educators at the schools prefer to stick with more traditional modes of teaching and learning rather than risk technology failures in the middle of instruction.

4. Supporting teachers

In response to the question, “Why did your school decide to use technology?”, over 68 percent of leader-respondents said that a goal of using technology was to better support their teachers. At the same time, however, the third highest-reported challenge with implementing technology in the classroom (47 percent of respondents) among teachers and leaders alike was access to high-quality professional learning for teachers. Some of the private schools we visited faced similar challenges. One independent school leader, for example, said that most of the teachers are relatively new to technology and are not yet accustomed to using the internet for learning and research, much less for pursuing new approaches to instruction writ large.

5. Financing technology integration

Sixty-two percent of government schools surveyed reported that funding for technology comes directly from the department of education. Forty-one percent said they used money from their existing school budget to finance tech infrastructure. That said, funding was also the most common challenge respondents cited (56 percent).

At one school we visited on the Western Cape, the principal said he would like to expand the blended-learning program to include not just math but also literacy, however the school must wait for funding. Break-ins and theft are also a major concern for the school, so security of technology is a priority. The school feels that it cannot bring more learning tech resources into the school until it has proper security measures in place to accommodate it—a significant added expense. Overall, the school faces a lack of funding to offer training on implementing them for teaching and learning and fully take advantage of its existing technological resources like their tablets.

6. Defining success

Among the schools surveyed, the majority have bold goals behind using technology for education. The top three responses to the question, "How does your school define learner success while using technology and digital learning?" were improved academic grades, improved test scores, and greater student engagement. At the same time, well over half of the respondents reported that it was "too early to tell" if technology use had produced the results that they wanted. The data may suggest that many schools do not have interim measures to understand if their digital learning efforts are working for the students or not.

Recommendations

Numerous variables, such as talent, funding and factors beyond the school walls, all inherently shape a blended model. These recommendations, therefore, are aimed at how schools trying to leverage technology might do so with greater success, but are by no means meant to be comprehensive or exhaustive. Given the low survey response rates, we offer the following recommendations as suggestions and hypotheses that ought to be further considered in the broader national and regional context.

Spur efforts to deliberately connect online and offline learning

The survey findings suggest that even if a school has connectivity to the internet (per DBE's list that it drew from for our sample), online learning may not be occurring. These schools might prove a promising place for provincial governments to target future blended- and online-learning initiatives, given that they have at least some infrastructure already in place.

At the school level, school officials and teachers who are already using online learning should constantly look for ways to connect students' digital learning time directly back to face-to-face instruction. Crucially, this will hinge on using the data from online activities, including but not limited to usage and assessment data. Though learners may often appear engaged in learning when using technology, without collecting and analyzing data from those exercises, teachers will be hard pressed to know whether technology is having its desired effect, and whether technology is being used to its fullest potential to shape offline lessons. Connecting online and offline modalities will be easier if schools adopt software that allows teachers to consistently track and analyze student performance over time.

Additionally, even if teachers face obstacles such as connectivity to integrating online and offline activities, teachers can find alternative ways to cohesively link face-to-face instruction to learning even without access to online data. For example, at one rural school we visited, students spend two hours each week using digital learning programs in math and literacy which do not capture data on student performance. Teachers however, assign a paper-based assessment or practice to students following each online activity to capture how much the students learned and understood from the online program. While not ideal, these workaround solutions demonstrate that a coherent instructional model—rather than merely the presence of devices and connectivity—is a core driver behind successfully pursuing blended-learning innovations.

Target gaps in the edtech market with disruptive innovations

Among survey respondents, math was reported to be the most common blended subject. Pursuing a blended math model indeed makes good sense if the tools to support that model are among the strongest available edtech curriculum products that align to South Africa's national curriculum. However, school leaders should invest time and attention into ensuring that teachers and students are confident using the products and are connecting offline and online learning in meaningful, productive ways. That way, if and when a school is ready to offer additional blended subjects, it will have first improved upon the underlying instructional model in ways that could support additional classes and subjects as well.

That said, the data also suggests an opportunity for both the government and entrepreneurs to develop non-math, curriculum-aligned software programs that could increase blended-learning implementation across additional core and elective subject areas. As disruptive innovation theory suggests, among schools and entrepreneurs hoping to disrupt entrenched instructional models, thoses areas with the fewest curriculum and content tools on offer are likely some of the most promising pockets for new innovations to get their start.

Where connectivity is unreliable, design models around limitations

As with most countries, the data suggests that South Africa will need increased investments in basic connectivity and infrastructure to fully take advantage of blended-learning models. For example, even if a school were to possess computers for every child, poor connectivity could stifle putting those devices to work. That said, some blended learning models and tools require far less infrastructure than others. Station and lab rotations, for example, tend to allow for student engagement with technology while also not overloading the available internet at any one time. Two of the schools we visited use station rotation to help each learner get at least some time on a digital learning platform to practice at her own pace. Yet they find that the whole lesson doesn't fall apart if there is not internet on a given day. Instead, a teacher can easily substitute the online learning station with another enrichment activity to keep students engaged and on track.

There are also promising opportunities for schools to make "online" learning possible in the classroom even without internet access. For example, BluPoint, which offers digital offline technology for free to educators, allows use of digital content even when there is no internet available. Then whenever there is connectivity, BluPoint will sync student data to a cloud. JET Education Services reports that the schools which it has supported to integrate BluPoint are seeing positive results. Approaches like these suggest that although poor connectivity must serve as a design consideration when schools are choosing their models, it should not be prohibitive of instructional innovations that leverage technology.

Build partnerships among the tiers of the education system

Efforts in blended learning, or even to get started using technology, should be integrated across the levels of the education system. For example, if a provincial government decides to supply schools with technology, it needs to also set up a human capital structure of ICT support in the district that connects on a frequent basis to schools. Both teachers and school leaders should be trained in effective ways to leverage technology to help students learn. As some of our case studies demonstrate, one innovative educator at a school can spark significant change, but to scale, schools will need more people—and centralized support structures for them—to guide the effort.

Still, this will require supporting those early stage innovators who tend to operate in a siloed manner. For example, at a government school we visited, one teacher said his greatest challenge to effectively implementing blended learning is feeling isolated in his efforts. He said that other teachers at his school prefer to retain the "chalk and talk" method and by and large are not leveraging the technology and devices available at the school. To some degree, the school leadership recognizes the teacher's innovative efforts, but has not encouraged other teachers to try new practices with digital learning. One response to these dynamics might be to connect these early-adopter educators

across regions, to form 'support networks' that can at once curb individual teacher innovators' sense of isolation, while also catalyzing momentum in blended efforts more broadly.[27] Online forums or applications could also begin to foster stronger communities among early adopter educators around the country.

Foster cross-school and cross-sector collaboration

Connecting regional or national efforts could also mitigate costs to the system. Schools across the country face many of the same financial hurdles to expanding technology use and digital learning. In light of these shared challenges, schools could support each other, in particular through cross-school and cross-sector (public and private) collaborations. For example, Hatfield Christian School,[28] a private school in Gauteng, created an online curriculum 8 years ago and has since partnered with over 50 disadvantaged public schools around South Africa to support each in adopting their digital courses. Hatfield devotes three years to working with every school to ensure a smooth uptake and track results of learners over time. This partnership in digital learning integration comes at no cost to the public schools. Partnerships like these stand to offer economies of scale across schools looking to get started integrating digital, CAPS-aligned learning into their models.

Set the right metrics and measurements to drive innovations forward

Setting the right metrics for any technology-based or blended-learning program is a critical starting point. Given that the vast majority of respondents said that it was "too early to tell" whether technology was producings its hoped-for results, schools should begin to implement interim success metrics that continually measure a program's success. For instance, at the private network of schools Future Nation in Gauteng,[29] the leadership established a feedback channel for teachers to actively evaluate how technology is working on a regular basis for them and their students. By inviting teachers to participate in critiquing and deciding which digital learning programs work best and why, the school as a community is creating a network of practice that is constantly measuring the success of the blended-learning program, and tweaking the model in circumstances when it is not succeeding. It is worth noting that these metrics will likely vary depending on the particular problems a school or educator is hoping technology might help to solve. For example, at one school combatting behavior issues, interim measures might include reports of higher student engagement or time on task, whereas at another, seeking to change adult mindsets, these measures might gauge educator or parent satisfaction.

27. The FUSE fellowship model spearheaded by the Highlander Institute in the U.S. has piloted this approach regionally and found that network effects among early adopter teachers can be a powerful lever for spreading both best practice and supports among educators. For more information on their approach see http://fuseri.highlanderinstitute.org/.

28. See Appendix E.

29. See Appendix E.

Conclusion

As described earlier, due to the varying partnership models that we forged across the three countries, we do not intend for readers to directly compare the data sets among Brazil, Malaysia, and South Africa. The sampling methods that we drew from were at once too diverse and too constrained to each context to make broad conclusions in a consistent manner across these distinct geographies.

Rather, each survey provides insights into some of the technology opportunities and challenges emerging in each country, specific to the sample of schools and educators we were able to reach through our survey partners. In the final survey remarks below we recommend how the survey instrument might be refined and deployed in a manner to make consistent, reliable regional, countrywide and inter-country conclusions about blended-learning implementation rates, opportunities and challenges.

Still, without comparing the samples in an apples-to-apples manner, a number of common themes emerged across all three samples that bear noting.

First, the need to clearly distinguish between tech-rich versus blended-learning models arose across all three samples. Tech-rich models may use technology as a productivity, research, or assessment tool. Blended models, on the other hand, use technology to deliver content directly to students in a manner that in turn shapes offline learning as well. This distinction is not normative: both tech-rich and blended-learning models can provide valuable, enriching learning experiences to students and can help teachers to organize teaching and learning in new ways.

The broader outcomes that tech-rich versus blended efforts stand to produce, however, vary. Our research suggests that online and blended learning will be crucial drivers for scaling new instructional models that offer both greater access and more reliably differentiated and customized learning experiences. On the other hand, tech-rich models tend to hinge exclusively on the quality and initiative of individual teachers and leaders. Moreover, tech-rich models often maintain the same, underlying time-based instructional model in place in a traditional, analog school or classroom.

Making this distinction a more overt and clear component of the global, national, and local education technology conversation could prove crucial to helping countries, states, schools, and technology vendors more deliberately leverage technology investments to shift instruction. School officials would be wise to identify those schools or networks of schools in their regions or countries that are implementing blended learning and to highlight those efforts as concrete, observable examples of new instructional models. From there, others do not need to adopt blended-learning models identical to those early innovators. Rather, they can draw from existing efforts to adapt and design models that fit their particular circumstances (Horn and Staker, 2015).

Clarifying this distinction might also begin to streamline and pool demand that could drive up the supply of edtech—particularly curriculum and content tools—that could begin to support more and diverse blended-learning models that align to national languages and curriculum. This market stands to grow as more schools pivot to demanding tools that help teachers to shift their instructional models.

Second, innovations grow differently in different circumstances, depending on the success metrics to which they are held. In at least two of the countries, namely South Africa and Malaysia, the degree of national centralization, of both curriculum and tools, clearly affects how blended learning stands to grow in particular geographies. Centralized models offer both upsides and downsides when considering how to spur and scale innovation generally, and blended learning in particular.

As seen in Malaysia's Frog VLE platform roll-out, a highly centralized system can effectively leverage its power to deploy a single technology initiative across the entire public system. In a country like Brazil, in which the school system is deliberately less centralized, mandating common platform, technology, or instructional model efforts would be far less feasible. A common platform could prove an influential lever for helping more schools shift and improve their instructional models more quickly. As we already saw within schools that we visited, the shared platform is well-suited to allowing educators to share curriculum-aligned content and lessons with one another. Given that all public schools have adopted the Frog VLE platform (to some extent) the same resource sharing efforts could happen theoretically among educators and schools countrywide. This stands to lend powerful efficiencies to spreading innovations in online content that otherwise remains in silos. Moreover, the national curriculum makes this sort of sharing particularly powerful, especially in countries that lack a robust supply of edtech providers creating aligned content, as is also the case in non-math subjects in South Africa.

A highly centralized national technology roll-out, however, poses some risks. For example, focusing on a platform as the unit of innovation or implementation risks schools focusing merely on the technology itself, rather than the instructional models that can be wrapped around that tool or set of tools. This may in turn limit schools' willingness or enthusiasm to innovate beyond traditional instructional models already in place before adopting the platform. The same might be said of any centralized device roll-out, such as distributing computers or smart boards to schools. Without deliberately designing a new instructional model around these tools, and pairing that effort with teacher professional development to support that new model, schools are likely to simply integrate technology tools into existing instructional practices.

Centralized metrics can have similar effects on how technology innovations evolve. Metrics—or lack thereof—guiding technology and instructional innovation should be approached with sensitivity to the fact that innovations grow along the metrics to which we consciously or unconsciously hold them. Any government- or school-imposed metric of success will shape how technology grows in classrooms over time. In general, our prior research on education innovation suggests that centralized metrics are best used to emphasize outcomes, rather than inputs (Horn and Mackey, 2011). This in turn allows innovations in how different schools and educators use technology to flourish, while gauging, in a centralized and comparable manner, whether those innovations are driving towards the outcomes that the education system is hoping to produce.

All three countries' ICT goals historically overemphasized technology inputs (devices, tools, etc.) and under-emphasized the learning outcomes technology might produce. In a similar vein, Malaysian schools' current key performance indicators (KPIs) focus heavily on technology usage, with less emphasis on instructional models or student outcomes. This in turn likely encourages adoption of Frog VLE as tool absorbed into traditional classrooms, rather than fundamentally rethinking instructional models from the ground up.

That said, the survey surfaced a relatively wide range of definitions of "success," even within each country, guiding technology implementation. Moreover, over one third of respondents in all three countries said it was "too early to tell" whether technology was producing the desired results. Both of these facts suggest that apart from countrywide metrics guiding technology implementation, more intermediate and local implementation benchmarks might help guide purposeful technology integration in schools. Especially given how nascent the field of blended learning appears to remain across all three geographies, these interim benchmarks should relate to student outcomes, rather than just technology access or inputs, to allow blended-learning models to evolve and grow from the ground up.

Given the wide array of definitions of success, interim benchmarks of successful technology integration would likely be best defined by schools themselves, framed around the specific problem or aspect of students' learning they are most hoping to address through blended learning. Without these school-specific outcomes, on the other hand, purely centralized metrics risk constraining instructional innovation too early on, without letting educators and schools explore the various problems different approaches to blended learning might be able to tackle.

Third, infrastructure and human capital pose some of the greatest challenges to implementing technology in general, and blended learning in particular. Across all three surveys, connectivity, infrastructure, and educator professional development ranked among the greatest challenges in implementing technology in schools. These results suggest that connectivity and teacher support are major areas for countrywide investment to support blended-learning innovation.

But absent major infrastructure overhauls or human capital investments, these findings also highlight the importance of not overstating education technology's potential absent the logistical and human factors that need to be in place to realize that potential. Moreover, these challenges suggest that those implementing technology in schools should take into consideration these particular constraints when designing instructional models—rather than designing ambitious models absent realistic understanding of poor connectivity or lack of educator preparation.

In approaching such designs, stubborn limitations to infrastructure should not deem blended learning an impossible feat. For example, certain blended-learning models—such as station rotations—require relatively few devices and less bandwidth than a more elaborate, one-to-one computer model. In some cases, school systems might consider shifting limited devices and bandwidth to only the highest leverage instructional uses of technology. This might mean relying less on technology for administrative or tech-rich purposes, and doubling down on technology to deliver online learning, at least until infrastructure becomes more reliable. In other words, educators and students can still reap the benefits of blended-learning innovations before entire schools or regions can secure more reliable Internet connectivity or the latest devices. All three countries should also consider the rising rates of mobile penetration, and how that may affect infrastructure needs and opportunities down the line.

Likewise, educator development should be considered a design constraint, and an effort that must always be paired with technology implementation, rather than seen as an afterthought to explain poor technology outcomes. Coordinating high-quality professional development to support blended learning an ongoing challenge, even in more developed markets like the U.S. where blended-learning implementation and tools are further along. Consistent with helping educators and leaders to distinguish between tech-rich and blended approaches, allowing educators to see blended learning in action (in person or over video) can prove a powerful first step to helping educators to view technology as a lever to fundamentally shift instructional models. Additionally, concerted school-wide or regional efforts to connect early adopters with one another can offer another powerful lever to catalyze develop opportunities from the ground up.

Policy Implications

Understanding trends like these can help national and local policymakers to create the structures, supports, and incentives that can lead to both implementation and continuous improvement of blended-learning models across their school systems.

First, policymakers should modernize their national ICT plans and strategies in order to ensure that technology is increasingly used to transform instructional models in schools. Historically (and rightfully so), ICT efforts focused on connectivity and access to technology writ large. As learning software continues to dramatically improve, policymakers have an opportunity to double down on technology not as a mere supplement to traditional education, but as a core component of new approaches to instruction (Horn and Staker, 2015). To do so, policymakers will need to pair funding efforts to expand access to technology with efforts to specifically drive new tech-enabled learning models forward. This includes continuing to emphasize connectivity and infrastructure in schools, while also pairing these systemic investments in infrastructure and technology with investments in professional development experiences that focus on instructional model innovation.

Second, policymakers should begin to evaluate technology efforts on the basis of student outcomes, rather than technology inputs. The metrics that guide education innovation broadly and technology integration specifically will inevitably shape how edtech innovations grow over time. Policymakers should move beyond measuring schools' technology inputs—like devices or usage data—to measuring the outcomes of technology-enabled instructional models (Horn and Mackey, 2011). Moreover, particularly in highly-centralized systems, policies can support centralized success metrics while still encouraging local school systems to create interim measures to continuously gauge their progress against these broader outcome metrics. These interim measures can help educators and leaders to continuously benchmark if and how technology is supporting instructional practices in schools to yield better student outcomes

Third, policymakers should take pains to understand where gaps in the education technology market may be holding back instructional innovations. In all three countries, varied access to content tools in some core and non-core subjects poses major limitations to how far educators are able to push online and blended learning. To help unlock edtech markets, policy makers can use financial levers—such as X-PRIZE style competitions or research and development funding to edtech entrepreneurs—or policy levers—such as pooling demand across multiple school systems—to spur innovation among content providers (Bailey, Schneider, and Vander Ark, 2013).

Further Research & Opportunities

The three data sets collected in the course of this study provide an initial look at technology and blended-learning efforts from a sample of educators and school leaders. Our ability to sample schools countrywide was limited due to time, cost, and logistical constraints. In addition to the costs of forging partnerships and finding distribution channels for the survey, a range of factors may have contributed to low response rates, such as access to reliable contact information for school leaders and teachers, the length of the survey, brand recognition (although we partnered with local organizations to mitigate this), or the overall framing of the survey.

Ideally, looking ahead this or similar surveys could be administered across additional samples, either capturing (1) a broader swath of practitioner perspectives or (2) surveying a random sample of educators or leaders, regardless of their access to technology, email, social media—rather than those already connected to innovative efforts as identified through our partner organizations. As discussed in previous sections, this should include piloting the survey on a small scale to test for language or sensitivity to factors that may yield high rates of incomplete responses.

Upon publication of this report, we made our blended-learning survey available for free on our website, www.blendedlearning.org. Our hope is to continue administering iterations of the survey in additional countries, refining the survey questions, and continuously improving the reach and quality of the data. We also hope that others will use the survey to explore technology and blended-learning dynamics in their own regions and nations.[30]

Of course, this survey is only one of many tools to begin to gauge the growth, quality, and strategies shaping technology integration efforts across international education systems, particularly in countries struggling to maintain basic infrastructure needed to support new instructional models. For example, given that infrastructure remains challenging in many schools and countries, further research could highlight specific schools or approaches that are overcoming infrastructure barriers to still put technology to use in innovative ways. Additional research could also make efforts to crosswalk data collected through student and family experience surveys (such as the recent 2017 Plano CBE and Omidyar report on technology usage among low- and middle-income students and families in Brazil), to begin to compare school- and student-level technology survey data.

30. When using the survey, researchers would be wise to continue to tweak the language in culturally-appropriate ways to best delineate between respondents that are pursuing blended versus tech-rich efforts. For future surveys we might consider using videos or visuals to effectively demonstrate the difference between blended and tech-rich models at the beginning of the survey. Short of that, researchers should conduct informal focus groups on the language specific to national or regional edtech conversation. How respondents can access the survey should also be considered in light of country- or region-specific circumstances. For example, we ensured that our survey was available to be taken on mobile devices, and over 60 percent of respondents to the Brazilian survey completed the survey on some sort of mobile device.

Additional research might also explore the range of out-of-school online learning occurring at a regional or national level. For example, to our knowledge none of the schools that we visited were using fully online courses in their blended-learning model. Tracking those models could begin to fill out a more complete picture of blended and online activity regionally and countrywide. As a result, schools and leaders within and across geographies can learn from the shared challenges and innovative approaches that technology can support.

This data can also be a crucial and strategic tool to gauge the rate and evolving models of blended-learning efforts in the long run. If edtech investments continue to grow at the rates that analysts predict, technology will increasingly become part of our modern approach to teaching and learning. Although technology can contribute to an array of school models, online and blended learning programs represent one of the most profound opportunities to shift industrial-era instructional models that are ill-equipped to reach each and every student in a differentiated, customized manner. By the same token, technology will not deliver on this potential if it is not implemented in a manner that transforms instruction. As such, we hope that this research and the implementation of our recommendations can continue to support the collective understanding of technology-enabled instructional models that offer the chance to scale access to learning at a rate and manner historically out of reach.

Appendices

Appendix A: Blended-Learning Model Taxonomy

1. **Rotation model** — A course or subject in which students rotate on a fixed schedule or at the teacher's discretion between learning modalities, at least one of which is online learning. Other modalities might include activities such as small-group or full-class instruction, group projects, individual tutoring, and pencil-and-paper assignments. The students learn mostly on the brick-and-mortar campus, except for any homework assignments.

    a. **Station rotation** — A course or subject in which students experience the Rotation model within a contained classroom or group of classrooms. The Station Rotation model differs from the Individual Rotation model because students rotate through all of the stations, not only those on their custom schedules.

    b. **Lab rotation** — A course or subject in which students rotate to a computer lab for the online-learning station.

    c. **Flipped classroom** — A course or subject in which students participate in online learning off-site in place of traditional homework and then attend the brick-and-mortar school for face-to-face, teacher-guided practice or projects. The primary delivery of content and instruction is online, which differentiates a Flipped classroom from students who are merely doing homework practice online at night.

    d. **Individual rotation** — A course or subject in which each student has an individualized playlist and does not necessarily rotate to each available station or modality. An algorithm or teacher(s) sets individual student schedules.

2. **Flex model** — A course or subject in which online learning is the backbone of student learning, even if it directs students to offline activities at times. Students move on an individually customized, fluid schedule among learning modalities. The teacher of record is on-site, and students learn mostly on the brick-and-mortar campus, except for any homework assignments. The teacher of record or other adults provide face-to-face support on a flexible and adaptive as-needed basis through activities such as small-group instruction, group projects, and individual tutoring. Some implementations have substantial face-to-face support, whereas others have minimal support. For example, some flex models may have face-to-face certified teachers who supplement the online learning on a daily basis, whereas others may provide little face-to-face enrichment. Still others may have different staffing combinations. These variations are useful modifiers to describe a particular Flex model.

3. **A la carte model** — A course that a student takes entirely online to accompany other experiences that the student is having at a brick-and-mortar school or learning center. The teacher of record for the a la carte course is the online teacher. Students may take the a la carte course either on the brick-and-mortar campus or off-site. This differs from full-time online learning because it is not a whole-school experience. Students take some courses a la carte and others face-to-face at a brick-and-mortar campus.

4. **Enriched virtual model** — A course or subject in which students have required face-to-face learning sessions with their teacher of record and then are free to complete their remaining coursework remote from the face-to-face teacher. Online learning is the backbone of student learning when the students are located remotely. The same person generally serves as both the online and face-to-face teacher. Many enriched virtual programs began as full-time online schools and then developed blended programs to provide students with brick-and-mortar school experiences. The enriched virtual model differs from the flipped classroom because in enriched virtual programs, students seldom meet face-to-face with their teachers every weekday. It differs from a fully online course because face-to-face learning sessions are more than optional office hours or social events; they are required.

For more details on these models and examples of each in action, see www.blendedlearning.org/models.

Appendix B: Survey Instrument

All questions required unless otherwise indicated.

Introduction

You are invited to take part in a research survey about technology in primary and secondary education. Your participation will require approximately five minutes and is completed online at your computer or on your mobile phone. There are no known risks or discomforts associated with this survey. Completing this survey will enter you for a chance to win a signed copy of the book Blended: Using Disruptive Innovation to Improve Schools. Taking part in this study is completely voluntary; if you choose to be in the study you can withdraw at any time. Your responses will be kept strictly confidential, and digital data will be stored in secure computer files. At the closure of the survey, you may be contacted by the Clayton Christensen Institute for an invitation to create a profile of your school for the Blended Learning Universe Directory. Otherwise, any report of this research that is made available to the public will not include your name or any other individual information by which you could be identified. If you have questions or want a copy or summary of this study's results, you can contact Katrina Bushko, researcher at the Clayton Christensen Institute, via email: kbushko@christenseninstitute.org.

Clicking the "Next" button or arrow below indicates that you are 18 years of age or older, and indicates your consent to participate in this survey. Thank you for your time.

Tell us about yourself and your school

1. Your name

2. Your position (Check all that apply)
   a. Teacher
   b. Principal
   c. Administrative Staff
   d. Other — Write In (Required)

3. Your phone number

4. Your email address

5. School name

6. School address, physical

7. School website

8. School type

a. Malaysia: SK

b. Malaysia: SJKC

c. Malaysia: SJKT

d. Malaysia: SMK

e. Malaysia: SM

f. Malaysia: SMKA

g. Malaysia: SM Seni dan Sukan

h. Malaysia: SMT/V

i. Malaysia: Other — Write In (Required)

j. Brazil: Pública Municipal

k. Brazil: Pública Estadual

l. Brazil: Pública Federal

m. Brazil: Privada

n. Brazil: Outra — Insere (Obrigatório)

o. South Africa: Public

p. South Africa: Independent, low-fee

q. South Africa: Independent, mid-fee

r. South Africa: Independent, high-fee

s. South Africa: Special needs school

t. South Africa: Early childhood development centre

u. South Africa: Aftercare learning centre

v. South Africa: Other — Write In (Required)

Are you using technology in the classroom?[31]

1. Do you/Does your school[32] use online learning in some way? Meaning, some or all of the instruction takes place using internet connected hardware/software?

a. Yes

b. No

31. The initial purpose of this section was to get a feel of whether or not a school may be implementing blended learning. The two questions we asked in this section represent two of the three parts of a blended-learning program, according to the Christensen Institute definition: (1) In part online, with some element of control over the time, place, path, or pace of their learning, and (2) The modalities along a student's learning path are connected to provide an integrated learning experience.

32. For some questions in this survey, we tailored the language to the respondent. If a respondent indicated that they are a teacher, they were shown questions phrased in such a way that would pertain to their own classes (e.g. Do you use online learning in some way?). If a respondent indicated that they are something other than a teacher such as a principal or administrator (or in addition to a teacher), they were shown questions phrased in such a way that would pertain to the whole school (e.g. Does your school use online learning in some way?). From this point forward, questions with this distinction will be marked with an asterisk.

2. Does at least some student learning happen at a supervised school location away from home?[33]

a. Yes

b. No

3. Are online and offline activities connected in some way? For example, you/teachers help students while they learn online and use results from the online platform to inform face-to-face instruction.*

a. Yes

b. No

How are you using technology?

1. What hardware are you using? (Check all that apply)

a. Desktops: Windows

b. Desktops: Apple[34]

c. Laptops: Windows

d. Laptops: Apple

e. Laptops: Chromebooks

f. Laptops: Netbooks[35]

g. Tablets: iPads

h. Tablets: Android

i. Cell/smart phones

j. Smart board with laptop or desktop[36]

k. None

l. Other — Write In (Required)

2. What software are you using? Please list all programs.[37]

3. What grade levels [do you teach that] are using technology? (Check all that apply)*

a. Malaysia: D1

b. Malaysia: D2

33. Only included in the South African version; however, the data we received on this led us to believe that this was confusing to educators, since a large percentage replied "no," which would indicate that they were part of a full-time virtual school. We omitted the third part of our definition of blended learning — where learning takes place in part in a brick-and-mortar location away from home — as a question in the Brazilian and Malaysian versions due to the nature of the education systems and audiences. Education is compulsory in Brazil, and although [online] homeschooling (a type of program we would not consider to be blended learning) falls in a grey area of the law, there have been multiple failed amendments attempting to officially recognize homeschooling as a valid educational option. In essence, it is virtually impossible to not send a school-aged student to a brick-and-mortar school for their education.

We also did not include this question in the Malaysia version because we knew that those receiving the survey were public school teachers, which would not include any potentially full-time online virtual schools not considered to be practicing blended learning.

34. This was not included in the South African version.

35. Only included in the Malaysian version.

36. Only included in the South African version.

37. Answer not required.

c. Malaysia: D3

d. Malaysia: D4

e. Malaysia: D5

f. Malaysia: D6

g. Malaysia: T1

h. Malaysia: T2

i. Malaysia: T3

j. Malaysia: T4

k. Malaysia: T5

l. Malaysia: None

m. Malaysia: Other—Write In (Required)

n. Brazil: Educação Infantil

o. Brazil: 1º Ano

p. Brazil: 2º Ano

q. Brazil: 3º Ano

r. Brazil: 4º Ano

s. Brazil: 5º Ano

t. Brazil: 6º Ano

u. Brazil: 7º Ano

v. Brazil: 8º Ano

w. Brazil: 9º Ano

x. Brazil: 1º EM

y. Brazil: 2º EM

z. Brazil: 3º EM

aa. Brazil: Nenhum

bb. Brazil: Outro—Insere (Obrigatório)

cc. South Africa: Pre-Reception

dd. South Africa: Reception

ee. South Africa: 1

ff. South Africa: 2

gg. South Africa: 3

hh. South Africa: 4

ii. South Africa: 5

jj. South Africa: 6

kk. South Africa: 7

ll. South Africa: 8

mm. South Africa: 9

nn. South Africa: 10

oo. South Africa: 11

pp. South Africa: 12

qq. South Africa: Post-matric

rr. South Africa: Aftercare

ss. None

4. What subjects [do you teach that] are using technology? (Check all that apply)*

a. Malaysia: Bahasa Melayu

b. Malaysia: English Language

c. Malaysia: Bahasa Cina

d. Malaysia: Bahasa Tamil

e. Malaysia: Mathematik

f. Malaysia: Dunia Sains dan Teknologi

g. Malaysia: Pendidikan Islam

h. Malaysia: Pendidikan Moral

i. Malaysia: Pendidikan Jasmani

j. Malaysia: Pendidikan Kesihatan

k. Malaysia: Pendidikan Seni Visual

l. Malaysia: Dunia Muzik

m. Malaysia: Sains

n. Malaysia: Sejarah

o. Malaysia: Reka Bentuk Teknologi

p. Malaysia: Teknologi Maklumat dan Komunikasi

q. Malaysia: Matematik Tambahan

r. Malaysia: Fizik

s. Malaysia: Kimia

t. Malaysia: Biologi

u. Malaysia: English for Science and Technology

v. Malaysia: Prinsip Perakaunan

w. Malaysia: Ekonomi Asas

x. Malaysia: Perdagangan

y. Malaysia: Geografi

z. Malaysia: Other

aa. Brazil: Matemática

bb. Brazil: Língua Portuguesa

cc. Brazil: Informática

dd. Brazil: História

ee. Brazil: Ciências

ff. Brazil: Geografia

gg. Brazil: Inglês

hh. Brazil: Física

ii. Brazil: Biologia

jj. Brazil: Química

kk. Brazil: Arte

ll. Brazil: Sociologia

mm. Brazil: Filosophia

nn. Brazil: Espanhol

oo. Brazil: Nenhum

pp. Brazil: Outro — Insere (Obrigatório)

qq. South Africa: Maths

rr. South Africa: Reading/Writing

ss. South Africa: Natural Science

tt. South Africa: Physical Science

uu. South Africa: Life Science

vv. South Africa: Social Science

ww. South Africa: Computer Science

xx. South Africa: African Language

yy. South Africa: World Languages

zz. South Africa: Electives

aaa. South Africa: None

bbb. South Africa: Other — Write In (Required)

The Student's Learning Experience

1. What types of learning does a student[38] engage with in a typical week? (Check all that apply)

   a. Online learning[39]

   b. Teacher-led whole-class instruction

   c. Teacher-led small-group instruction

   d. Teacher-led individual instruction

   e. Group collaboration

   f. Hands-on projects

   g. Individual assignments

   h. Other — Write In (Required)

2. What percentage of student learning time is spent online weekly?

   a. 0–25 percent

   b. 26–50 percent

   c. 51–75 percent

   d. 76–100 percent

3. Where do students complete their online assignments?

   a. In the classroom, at an online learning station

   b. In the classroom. Students may select where they sit.

   c. In a computer lab at school

   d. In a designated open, online learning area inside the school[40]

   e. At home

   f. Not applicable

   g. Other — Write In (Required)

4. For students in classes where both digital learning platforms and a teacher are used for instruction, how many days a week do they typically spend at school?[41]

   a. Students come to school every day but have flexibility to arrive and leave on their own schedule

   b. Students attend school a few designated days of the week; the other days they spend working online

38. In South Africa, students are referred to as "learners."
39. In South Africa and Brazil, online learning/technology is referred to as digital learning/technology.
40. This answer did not appear in the South African version
41. This question only appeared in the South African version.

c. Students only come to school as needed; for example, students may schedule face-to-face meetings with a teacher

d. Students are not required to come to school because their work is entirely online

e. Not applicable

f. Other — Write In (Required)

5. For students in classes where both digital learning platforms and a teacher are used for instruction, how many days a week do they typically spend at school?[42]

a. Students come to school every day but have flexibility to arrive and leave on their own schedule

b. Students attend school a few designated days of the week; the other days they spend working online

c. Students only come to school as needed; for example, students may schedule face-to-face meetings with a teacher

d. Students are not required to come to school because their work is entirely online

e. Not applicable

f. Other

6. How has technology changed how students learn?[43]

How are teachers using technology?

1. How often do you/teachers give face-to-face instruction?*

a. Instruction is always delivered face-to-face by the teacher

b. Most instruction is delivered by the teacher and supplemented with digital lessons

c. Instruction is delivered half digitally and half by the teacher

d. There are specified days when the student comes to class for face-to-face instruction[44]

e. The student may seek instruction from the teacher according to his/her needs

f. Never. Instruction is provided entirely in a digital format.

g. Other — Write In (Required)

2. Does the teacher collect data using technology? What? How?[45]

42. This question only appeared in the South African version.
43. Answer not required.
44. This answer did not appear in the Brazilian version.
45. This question only appeared in the Brazilian version; answer not required.

More on Technology in the Classroom

1. Where do you/your school get the funding for your technology? (Check all that apply)*[46]

a. Funds come from existing school budget

b. Funds come from external organizations

c. Malaysia: We received contributions from parents

d. South Africa: We increased student fees

e. Government grant specifically for technology, digital learning and/or blended learning

f. I don't know

g. Not applicable

h. Other — Write In (Required)

2. What are your key challenges when using technology? (Check all that apply)

a. High-quality professional learning for teachers

b. High-quality professional learning for principals

c. High-quality professional services/technical assistance supporting model design

d. High-quality professional services/technical assistance supporting implementation

e. Guidance and/or support in selecting devices[47]

f. Guidance and/or support in selecting content

g. Guidance and/or support in selecting a learning management system (LMS)

h. Reliable and sufficient Internet connectivity

i. Network or community of practice

j. Examples to look to of emerging, successful models

k. Buy-in from staff

l. Buy-in from community

m. Funding and/or finance

n. The right personnel and partners to implement with high quality

46. This question only appeared in the South African and Malaysian versions.

47. Was not included in the South African version.

o. Technology not being a high priority in our district

p. Measuring implementation and progress to your goals

q. Public policies not conducive to innovation

r. Infrastructure problems (e.g. poor internet connectivity)

s. Not applicable

t. Other—Write In (Required)

3. Why did you/your school decide to use technology? (Check all that apply)*

a. To provide more course choices for students[48]

b. To facilitate more personalized student learning

c. To facilitate competency-based learning

d. To improve student academic outcomes

e. To improve student non-academic outcomes

f. To better support our teachers

g. To reduce instruction costs[49]

h. To improve (students' and teachers') access to and familiarity with technology

i. To improve (students' and teachers') access to content

j. I don't know

k. Not applicable

l. Other—Write In (Required)

4. How do you/your school define student success while using technology? (Check all that apply)*

a. Improved course completion rates[50]

b. Improved graduation rates

c. Improved academic grades

d. Improved academic test scores

e. Improved social/emotional learning

f. Improved student well being

g. Improved student time on task

h. Improved student conduct/behavior

i. Greater student engagement

48. This answer was translated to "Provide more options for students" in Portuguese for the Brazilian version.

49. Was not included in the Brazilian version.

50. Was not included in the Brazilian version.

j. Greater student autonomy

k. Uncertain

l. None

m. Not applicable

n. Other — Write In (Required)

5. Has using technology produced the results you wanted?

a. Yes

b. No

c. Too early to tell

d. Not applicable

6. Do you/Does your school plan to scale technology efforts?*

a. Not ready to expand

b. Expanding the number of classrooms using technology

c. Expanding the number of subjects using technology

d. Expanding the number of grade levels using technology

e. If part of a network of schools, expanding the number of schools using technology

f. Not applicable

g. Other — Write In (Required)

For a digital version of this survey please visit:
www.blendedlearning.org/survey or email info@christenseninstitute.org.

Appendix C: Brazilian Case Studies

Colégio Dante Alighieri

Urban | Private | São Paulo, São Paulo, Brazil | 4600 students

Blended Program

Edtech: Hardware
Desktops: Windows
Laptops: Windows
Laptops: Apple
Laptops: Chromebooks
Tablets: iPad
Cellphones
Edtech: Software[51]
Moodle, Google Apps for Education, Mosyle, Matific, Guten News, teacher-created content
Program Overview
Year Launched: 2014
Blended Grades: Infant education—3rd year high school
Enrolled: 4600
Blended Subjects
Math
Portuguese Language
History
Sciences
Geography
English Language
Physics
Biology
Chemistry
Art
Sociology
Philosophy
Spanish Language

Model Overview

Lab rotation, Individual Rotation & Flipped Classroom

When students go to any class at Dante Alighieri, they are expected to have reviewed content the night before so they can practice what they learn in class. This content lives in the LMS Moodle and includes videos and texts prepared by the teacher ahead of time.

In the classroom, students are split into two groups: one group that stays in the classroom with the teacher for more intensive, conceptual practice, and another group goes to another room with a technology teacher.

51. The software category on this page and in all subsequent case studies includes both instructional content and work tools such as learning management and data systems.

In the first classroom, students who need more help stay with their original teacher doing individual practice exercises both online and offline. The teacher floats around the classroom to help students on an as-needed basis. When students in this lab are finished with their practice, they are free to go to the other classroom and join their peers in different activities.

In the second classroom, all students are given a schedule of rotations, which they can use as a "checklist" of activities they can do at their own pace. These activities range from using the recording studio to create a song to doing online activities and exercises on various devices. There are usually more than three stations available for students, which they move through over the course of approximately four class periods to complete all activities. The technology teacher stays in this second classroom to monitor students and help where needed.

Moodle acts as an all-encompassing platform that helps tie everything together: it is not only where teachers store all the content for the students, but also where the students keep their own portfolio of work completed in their stations. Teachers then analyze this data to inform future student groups and activities.

Implementation Q&A

When you first implemented blended learning, why did you choose that particular model?

When we first implemented blended learning at Colégio Dante Alighieri, we were inspired by the belief that every student learns differently. We wanted to give students multiple modalities for learning, as well as a place where they could really hone their skills one on one with their teacher if they needed. This is what drove us to adopt our hybrid rotation model, and the fact that there just aren't enough hours in the school day to accomplish everything we wanted is what spurred the usage of a flipped classroom. Students not only have autonomy over their learning, but they are engaged in their studies and confident in themselves.

What's the one piece of advice you'd give to emerging blended-learning programs?

One of the most important things you need when starting a blended-learning program is having a school director who will support the teachers. The administration of the school must be involved and excited about blended learning if they want the whole school to succeed.

Next, you need someone from within the school to bring the professional development to teachers. Outside consultants do not know the cultures of the schools they work with, and so cannot be a great influence in the culture shift that must occur when implementing blended learning.

Lastly, when just starting, pilot. It doesn't matter how small your school is, test out your program with a few classes, then when you've worked out many of the problems and iterated on design, expand to more teachers and grades and subjects.

Other Notes

The school has a blended-learning support team consisting of 15 technology teachers who not only train the teachers at Dante Alighieri in both blended learning practices and technical fluency, but they also support them in classrooms with the students. Although they are currently a core part of the blended-learning program, the school hopes that their in-class support will become less and less necessary as teachers become more confident in their abilities to use blended learning.

Colégio Loyola

Urban | Private | Belo Horizonte, Minas Gerais, Brazil | 2600 studentss

Blended Program

Edtech: Hardware
Laptops: Windows Tablets: iPads Tablets: Android
Edtech: Software
Moodle, Khan Academy, MangaHigh
Program Overview
Year Launched: 2015 Blended Grades: 3rd–5th year Enrolled: 600
Blended Subjects
Portuguese Language Geography Math History Sciences

Model Overview

Station Rotation

At Colégio Loyola, students in grades 3–5 get to learn in a different way from their peers every other week. When they go to their regular classroom, the teacher divides students up into 2–4 groups (sometimes based on proficiency levels) and explains the activities that will be required from each station. These 2-4 stations are not necessarily contained in the student's normal classroom; teachers can take advantage of two additional multipurpose rooms that include access to a set of iPads, Android tablets, or laptops. At least one of the stations will use technology, and one will be used for intense intervention without tech. Depending on the teacher and the amount of stations there are, students will rotate to different stations when the teacher instructs them to, normally every 20–35 minutes.

Implementation Q&A

When you first implemented blended learning, why did you choose that particular model?

We started using blended learning based on the work Aline Soares did with the Lemann Foundation's blended-learning teaching experimentation group. In fact, coordinator Ms. Soares used technology before joining the group, but it was still very precarious. Working with a group, she was able to experiment with other ways of using technology. Both she and the school liked it and saw great opportunities for the students and very positive results in our practice.

What's the one piece of advice you'd give to emerging blended-learning programs?

Teachers who start using technology need to take risks, and need to test things in their practice. Teachers are often very afraid to use technology because they do not know how beneficial it can be to teaching and learning. But in fact, from the moment you try it you can see that it is beneficial.

Another important point is that the school needs to empower its teachers. So, it is important for the school to be clear that it is not enough to just *want* to adopt an innovative practice if it does not enable its practitioners to do so.

Colégio Pastor Dohms

Urban | Private | Porto Alegre, Rio Grande do Sul, Brazil | 1300 students

Blended Program

Edtech: Hardware
Laptops: Windows
Cellphones
Edtech: Software
Geekie
SuperProfessor
CrashCourse
WebAssign
Google Apps for Education
Classdojo
Gvdasa
YouTube
Program Overview
Year Launched: 2015
Blended Grades: 1st—3rd year
Enrolled: 300
Blended Subjects
Biology

Model Overview

Station Rotation & Flipped Classroom

In the blended-learning classroom, there are eight big round tables set up around the room. Two of these tables have laptops that were originally in the computer lab but that were brought into the class full-time to support blended classrooms implementing a Station Rotation model.

Before students come to class, they are expected to have watched lesson videos at home via CrashCourse to introduce them to the topic they will be studying in class. When students walk into the classroom, the teacher separates them into eight groups, two of which are groups for students who need extra review of past material. These eight groups are labeled by color with two groups per color. One color group engages in online interactive activities such as Geekie, another color group reviews past material using worksheets; the remaining two color groups perform practice problems out of their physical workbooks and textbooks. These last two groups are allowed to use their cellphones to access the videos that they watched before to refresh or revisit material. After 15 minutes of doing the activities at their station, students in the non-remedial groups rotate to a different station. The review group does not rotate with the rest of the class and is expected to do the current chapter's practice problems at home on their own.

As the students are working, the teacher circulates throughout the room to help individual students or groups with questions about the material or about the laptops. He uses data collected from the on- and offline activities in order to separate the students into groups and to provide targeted supports to students.

Implementation Q&A

When you first implemented blended learning, why did you choose that particular model?

There are many reasons why biology teacher Igor Nornberg chose to use this model of blended learning. First, he believes that it provides more meaningful learning: its versatile nature allows it to adapt to diverse realities and contexts of the classroom. Another important point he highlights is the neuroscience research that demonstrates the inefficiency of the lecture. Knowing the results of this research and the day-to-day experience in the classroom, there is no reason not to try out new methodologies. Technology is increasingly present in people's lives, and today, connecting technology with education is a necessity.

What's the one piece of advice you'd give to emerging blended-learning programs?

Just get started. Do not expect the best opportunity to come along before trying blended learning. If you wait to apply new methods until you are 100% certain of their success, you will never start. It's also important to remember that educational methodologies are always beta versions, and are in constant development.

Colégio Soter

Urban | Private | São Paulo, São Paulo, Brazil | 750 students

Blended Program

Edtech: Hardware

Laptops: Windows
Tablets: Android
Cellphones

Edtech: Software

Google Apps for Education, Sae Digital, Google Play Store Apps

Program Overview

Year Launched: 2016
Blended Grades: Infant education - 3rd year high school
Enrolled: 750

Blended Subjects

Math
Portuguese Language
History
Sciences
Geography
English Language
Physics
Biology
Chemistry
Art
Sociology
Philosophy
Spanish Language

Model Overview

Station Rotation

Colégio Soter Station Rotations are used at least once per semester for every subject. Teachers separate students into four groups of mixed academic levels. These groups sit at separate tables, which each have pieces of paper describing the assigned activity for that station. At least one of the stations uses a set of Android tablets on which students review content or give short evaluations through free apps found on the Google Play Store. Students are required to complete the assigned task in 20 minutes, after which the teacher directs them to move to the next activity. During this class, the teacher and at least one teaching assistant walk around the room to troubleshoot the technology and answer any questions students may have about the material. Based on the exercises and evaluations a student completes on- and offline, the teacher may assign extra practice for a student to do individually.

Flipped Classroom

Teachers are also required to use a Flipped classroom at least once per semester. In this model, students are assigned videos and exercises to do at home hosted through Google Classroom. When they come to class, the teacher groups those who didn't study the material at home into one group and lets the rest of the students pick their own groups of four to five. In these small groups, they are tasked with answering exercises, usually on a paper worksheet. The teacher walks around the room helping groups, and occasionally drawing the whole class' attention to explain a problem.

Implementation Q&A

When you first implemented blended learning, why did you choose that particular model?

We at Colégio Soter wanted to not only give students more autonomy over and variety in their own learning, but we also wanted to make learning a more continuous activity. The Station Rotation model is great for teaching many different skills and competencies in one class period. And we started implementing Flipped classrooms because we wanted to make the most of the time that students spent outside of school: since students only go to school half day, the other half can be used to prepare materials for the following day in class. We also thought that these would be the easiest blended learning models for our teachers to transition to.

What's the one piece of advice you'd give to emerging blended-learning programs?

One very important thing that schools have to be aware of and control is the balance with culture and staffing. We at Colégio Soter wanted to reinvent ourselves as an innovative school, and we need the full support of our teachers and coordinators. If everyone is not on the same page from day one, it will be difficult to continue doing blended learning and iterating on your program so that you can help students achieve their fullest potential.

Other Notes

The blended learning programs at Colégio Soter have represented radical shifts for the school staff, students, and parents. With successful pilot programs in 2016, the administration decided to invest a lot of time and energy training their teachers how to go about implementing Flipped classrooms and Station Rotations. Even with all this support, there were many teachers who were resistant to the change. Some left on their own, others were let go, but ultimately this made the the school director and blended-learning coordinator reevaluate their hiring processes. Now when they are looking for teachers, they must make sure that potential hires are open to the idea of blended learning and are eager to contribute to a school culture that is becoming more student-centered.

Colégio Vinícius de Moraes

Urban | Private | São Luís, Maranhão, Brazil | 700 students

Blended Program

Edtech: Hardware
Tablets: Apples
Edtech: Software
AgendaKids
Kahoot
Khan Academy
Socrative
Sisalu
UnoInternational
Program Overview
Year Launched: 2015
Blended Grades: 1st — 3rd year highschool
Enrolled: 700
Blended Subjects
Math
Portuguese Language
Computer Science
History
Sciences

Model Overview

Station Rotation & Flipped Classroom

Blended teachers at CVM use a mixture of Station Rotation and flipped classroom models. Using the AgendaKids app, teachers assign videos to watch and texts to read for the students to do at home. The next day, students come prepared to class to discuss what they learned at home and to use that knowledge for in-class activities.

In the classroom, students divide themselves into three or four groups and rotate through different stations on a teacher-led schedule. At least one station utilizes a set of iPads (purchased through the UNO technology program).

The teacher moves about the classroom freely, troubleshooting the technology, answering questions, and generally observing student practice and participation. Based on a student's performance in class, a teacher may assign a student extra practice to do at home, in accordance with their learning needs.

Implementation Q&A

When you first implemented blended learning, why did you choose that particular model?

Teachers at CVM started using a station rotation model in the preschool classes before they even knew what blended learning was. They had so much success with it because it allowed for them to have only one teacher in the class (not a teaching assistant) and the kids absolutely loved it. Shortly after this "pilot," they learned about blended learning through other schools, and more teachers decided to try using a rotation model, eventually adding a flipped classroom component to it.

What's the one piece of advice you'd give to emerging blended-learning programs?

There are three important pieces to our plan that make our blended-learning program successful: teacher training (in the style of blended learning), monitoring (to be able to adjust strategies when needed), and raising family awareness (so that everyone is on the same page). If you focus on those key points, you should be able to run a great blended-learning program. An additional important lesson that teachers at CVM have learned is that the blended-learning model (and the station rotation model in general) is good for students with special needs. The teacher can give them more attention than usual without disrupting the rest of the class.

Other Notes

Teachers and administrators at CVM make communication and collaboration a priority. Every other month, administrators hold a special class for parents to help them understand how their child is learning. This parent class uses a Station Rotation model to teach parents how technology fits into their children's curriculum. Teachers are in regular communication with parents via the AgendaKids app (which can be accessed on smartphones), and dedicate Fridays to sending weekly updates. Additionally, teachers at the school share classroom photos, videos, and accomplishments over Facebook and WhatsApp. They also use these platforms to help each other troubleshoot and plan blended-learning lessons.

Escola Projeto / Lápis de Cor

Urban | Private | Curitiba, Paraná, Brazil | 400 students

Blended Program

Edtech: Hardware

Tablets: iPad

Edtech: Software

TED ED
UNO International
ACADESC
WebQuest
Mangahigh
Khan Academy
Kadesk
Escola em Movimento
Duolingo

Program Overview

Year Launched: 2016
Blended Grades: Infant education—9th year
Enrolled: 400

Blended Subjects

Math
Portuguese Language
History
Sciences
Geography
English Language
Physics
Biology
Chemistry
Art
Physical Education
Music

Model Overview

Station Rotation & Flipped Classroom

Escola Projeto / Lápis de Cor bought 120 iPads four years ago through the UNO International technology program, and has just recently put them to use in a blended manner. All teachers at the school use a Station Rotation model with an optional component of Flipped classroom as well.

When students arrive in a classroom, they first learn what stations have been set up for the day: usually this consists of 3-4 different activities, one of which uses a set of iPads. These stations can be anywhere in the school: inside the classroom, in the open recreational courtyard, or in the library. Students decide which station they want to start with, then rotate to the other stations when the teacher directs them (usually every 20-30 minutes). However, if a student needs more time at one station, they are welcome to stay and finish that activity.

Teachers create these stations based on exams, homework, and observations of students. When there are stations in multiple parts of the building (for example, one station in the library and one in the courtyard), they ask teaching assistants to oversee a station where they are not present. At the end of each week, teachers are responsible for making corrections of students' work and creating lesson plans based on data they collect throughout the week.

Occasionally teachers implement a Flipped classroom model; in this model teachers assign videos for students to watch at home that will guide the activities they do in class the following day.

Implementation Q&A

When you first implemented blended learning, why did you choose that particular model?

Last year we watched a television program on innovative schools, which featured High Tech High School. We were awestruck and immediately realized that we wanted to do a similar flexible program in their school. A math teacher, along with a few others, piloted a small Flex program with some of their elementary students, but it was incredibly difficult to sustain. So, after much research, we decided to pilot a Station Rotation program with the students, which was a great success. Now all teachers have some sort of station rotation going on in their classroom.

What's the one piece of advice you'd give to emerging blended-learning programs?

First, don't give up. You not only needs to believe in the work they're doing, but also research and seek out examples to inspire your own program. Second, the administration must listen to the teachers. If you want your program to be successful, then you need to have everyone on board, and that means listening to and learning from your teachers so that you can understand how to better support them.

Other Notes

Each grade level chooses a project that they want to work on for the entire year. For example, second-graders may be interested in insects, so teachers will create lesson plans that revolve around insects and that encompass all different subjects. This fosters collaboration between teachers, and this culture carries over into their blended-learning planning.

Since starting their blended-learning program, educators at Escola Projeto/ Lápis de Cor have seen significant improvements in student academic achievement, most notably in their math classes. In 2016, seventh-year students scored an average of 63 percent on a annual mathematics examination; after a full year of blended classes, the same students (now in year eight) scored an average of 81 percent on the exam.

Escola Projeto Vida

Urban | Private | São Paulo, São Paulo, Brazil | 1100 students

Blended Program

Edtech: Hardware
Laptops: Chromebooks
Laptops: Netbooks
Tablets: iPads
Cellphones
Edtech: Software
Google Apps for Education, Khan Academy, Code.org, Kahoot, Quizlet, Rei da Matemática, Fábrica Que Faz Tudo, Tinytap, Scratch, Scratch Jr
Program Overview
Year Launched: 2016
Blended Grades: 2nd—9th year
Enrolled: 570
Blended Subjects
Math
Portuguese Language
History
Sciences
Electives

Model Overview

Station Rotation

Students at Escola Projeto Vida have at least one blended-learning class per week, and school wide, teachers practice blended learning at least once per month. When students come into a blended class, the teacher separates them into a few groups. These groups sit stations with different activities to do. At least one of the stations uses technology, for example using Khan Academy or to do collaborative group work on the iPads.

While the students are at their stations, the teacher circulates around the room helping individual students and groups with academic questions or to troubleshoot the technology. Teachers also take the data that they collect from apps like Google forms and Kahoot to guide their next lessons, in both blended-learning and traditional classes.

Implementation Q&A

When you first implemented blended learning, why did you choose that particular model?

We started to use this blended-learning model because we wanted to give our students more autonomy over their own learning. We also didn't want to just use technology for technology's sake: deeper and richer learning experiences come from different teaching structures and learning modalities, and that is what we are aiming for.

What's the one piece of advice you'd give to emerging blended-learning programs?

Teacher and coordinator professional development is key in running a successful program. The PD can't just be conceptual—teachers and coordinators need to experience learning in a blended model so that they understand how to teach in one. Another piece of advice is to keep in mind that your first experiences probably aren't going to be successful, so don't get discouraged. Start simple, but start. Practice is what will help improve your blended strategies over time.

Other Notes

One of the biggest points of pride at Escola Projeto Vida is their expertise in staff training for blended learning. To start, one coordinator trained her peers on the coordination team, who then held workshops and development sessions for all the teachers at the school. These sessions were both conceptual and practical, which helped teachers truly understand what it is to use technology in a blended way. This professional development program is also continuous, meaning that teachers meet almost every week to discuss pain points and create lesson plans with coordinators.

Escola Municipal Emílio Carlos

Urban | Private | Rio de Janeiro, Rio de Janeiro, Brazil | 420 students

Blended Program

Edtech: Hardware
Laptops: Netbooks
Edtech: Software
YouTube, Teacher-created content/blog, Google Forms
Program Overview
Year Launched: 2013 Blended Grades: 6th—9th year Enrolled: 400
Blended Subjects
History

Model Overview

Flex

When students arrive in history class, they start off their week in a traditional way: the teacher gives a lecture at the front of the class to introduce the topic for the week. During the next class period, the following day, the students take a diagnostic quiz (on physical paper because of lack of internet connectivity inside the classroom) on the material covered the day prior. From this, the teacher grades these quizzes and creates a personalized-learning path based on a "competency tree" he constructed to align students' pathways to their mastery level. These personalized learning pathways are available for all students to see on the teacher's blog, which also describes the different activities they are required to do.

During the next three class periods (50 minutes each), students follow their individual learning paths at their own pace. The activities they are assigned may range from watching YouTube videos to discussing the subject material in pairs to completing exercises that are more challenging than the diagnostic test they took. Because of the lack of internet in the classroom, all online activities must be downloaded by the teacher beforehand so that students can use the content in class.

Implementation Q&A

When you first implemented blended learning, why did you choose that particular model?

Teacher Eric Rodrigues realized that there must be a better way to conduct his class when he noticed that his students weren't achieving their full potential in his history class: over 30% of the students were not passing his class, even though he expected almost all of them to. So he re-thought the way he conducted his class: he wanted to stop being the "sage on the stage" and become more of a facilitator for student learning. With an individual rotation, students can have a richer learning experience by learning in multiple formats and in a way that is more competency-based than their normal classes.

What's the one piece of advice you'd give to emerging blended-learning programs?

Practice and reflect. Many times schools and teachers spend a long time debating theory, having meetings, and discussing changing classes, but actually execute very little. It is essential to act more and reflect with concrete data. From there, you can develop projects and processes with your real experiences.

Other Notes

Eric Rodrigues has had great success using his blended-learning model. At the beginning of the first year of implementation, he had over 30% of students who were not proficient in the course material. By the end of the year, that number had dropped drastically to only 12% of students needing remediation. Just this past year, he helped all of his students become proficient. This model, he noted, showed more promising academic results than his peers who taught in a traditional method.

Furthermore, Mr. Rodrigues has been slowly creating and curating all of the content and competency trees for his history courses since 2013. Although it has taken a lot of work upfront, this year (2017) is the first year he is able to completely reuse all the material, which saves him a significant time in lesson planning.

Appendix D: Malaysian Case Studies

SK Bandar Hilir

Urban | Public | PPD Melaka Tengah | Melaka, Melaka, Malaysia | 287 students

Blended Program

Edtech: Hardware
Laptops: Chromebooks
Laptops: Netbooks
Edtech: Software
Frog VLE
Explain Everything
Youtube
EduwebTV
Teacher-created content
Program Overview
Year Launched: 2016
Blended Grades: D2–D6
Enrolled: 259
Blended Subjects
Malay Language
English Language
Mathematics
Science
Electives

Model Overview

Lab Rotation

SK Bandar Hilir is one of 150 schools in Malaysia that have a Frog Classroom. This classroom is a designated space for students to use Chromebooks and the Frog VLE. The classroom has 14 tables made to form three semicircles for the students, and one table at the front of class for the teacher. Teachers and students know when they are slotted to use the classroom based on a preset timetable made at the beginning of the year.

Students in the Frog Classroom each have their own Chromebook and use these to access the teacher-curated content on the Frog VLE. After the teacher has introduced the new content to the class (via videos and worksheets uploaded onto the platform), the students then test their knowledge using the FrogPlay app. During this time, the teacher is at the front of the classroom or walks around to help students with difficulties.

Teachers upload content for each lesson beforehand. During class time, they act as a moderators to ensure a more student-centered learning environment. After students complete quizzes and assignments in or outside of the classroom, teachers will review their scores: if it they identify that a student is struggling, the teacher will work with that student individually to help with that particular area.

Implementation Q&A

When you first implemented blended learning, why did you choose that particular model?

SK Bandar Hilir's head teacher chose this model of blended learning because it is an approach that works well with young boys: the fact that there are many ways of learning (watch videos, doing exercises, playing games) keeps them entertained and interested in learning.

Also, teachers like the model because can offload some energy that historically went into lectures and lesson planning, making their jobs more sustainable. Similarly, after selecting the content once, teachers are able to use it again and again and even share it with other teachers, allowing time savings week over week and year over year.

What's the one piece of advice you'd give to emerging blended-learning programs?

It's not as difficult as one would imagine—where there's a will, there's a way. So be persistent and really believe that this is the future of learning, and you will be able to make the most out of your opportunities.

Other Notes

The Frog Classroom at SK Bandar Hilir was financed in part by a grant from the YTL Foundation, a private foundation in Malaysia, and in part by the school. In order to raise funds for the school, the head teacher reached out to parents for donations. Once she showed parents that the school was increasing their technology usage exponentially and had the possibility of hitting the government-set key performance indicators (KPIs), parents were willing to donate not only their money, but also their time and skills to build the new classroom.

Since it began using blended learning, according to the school's head teacher, the school is more focused on the four C's–communication, collaboration, critical thinking, and creativity–rather than only exam scores. This has been put into practice, as students are more engaged in their learning, while it is easier for teachers to give more individualized attention and feedback. At the same time, test scores have been increasing.

SK Convent Sentul

Urban | Public | PPD Sentul | Wilayah Persekutuan Kuala Lumpur, Malaysia | 360 students

Blended Program

Edtech: Hardware
Laptops: Chromebooks
Edtech: Software
Frog VLE
Quizizz
Kahoot
Google Apps for Education
Teacher-created content
Program Overview
Year Launched: 2015
Blended Grades: D1–D6
Enrolled: 360
Blended Subjects
Malay Language
English Language
Mathematics
Science
Electives

Model Overview

Lab Rotation

SK Convent Sentul has a designated computer lab with two long desks for student use, and a mobile technology cart that houses a set of Chromebooks. Teachers from all subject areas utilize this classroom based on set a schedule.

Students at SK Convent Sentul come into the computer lab and sit in teacher-assigned groups. These groups consist of students of all academic-levels, and the teacher rearranges the groups every few weeks. Each student is given a Chromebook to use for the class, on which they can access the Frog VLE. During class, the teacher usually introduces a subject to the whole class with content and materials that the teacher has prepared on the Frog VLE, then allows students to do their own research or use an application such as FrogPlay individually. After a set time, the teacher will then reconvene the whole class and review what they learned for the day.

Teachers prepare class materials beforehand and take into account student data when assigning homework. After class, the teacher reviews student data collected through the various applications used in class, and will adjust practice problems for individual students in their classrooms beyond the lab accordingly. This all takes place in the Frog VLE.

Implementation Q&A

When you first implemented blended learning, why did you choose that particular model?

When one of the school's teachers, Ms. Nisrin was studying at university to become a teacher, she was exposed to the Frog VLE in one of her classes. When she was assigned to work at SK Convent Sentul, she was tasked with bringing the Frog VLE into the school. Two years later, the school has flourished using the VLE.

What's the one piece of advice you'd give to emerging blended-learning programs?

From a teacher, one of the best pieces of advice is to have the support of the headmaster and the administration. If they can see progress and the students' excitement about blended learning, they will want to help grow the program and help create an innovative culture for all teachers.

From the headmistress' perspective, the most important thing is to never give up and to never stop learning. After a while, using the technology will become a part of the school culture, and to get it to that point, you have to work hard and keep trying.

Other Notes

Like many schools, SK Convent Sentul initially saw resistance from teachers towards using the Frog VLE in their classrooms. In addition to having a mandatory usage policy (which was enacted by the headmistress because she saw that the students were much more eager to learn using the computers), one teacher at SK Convent Sentul had the students advocate for the technology on their own: she would ask the students if they liked using the computers in her class, and when they gave a resounding "yes," she suggested to them that they should ask their other teachers to use the computers as well. This prompted more and more teachers to begin to implement the technology in their classrooms.

Furthermore, Ms. Nisrin has seen impressive academic progress while using the Frog VLE. Last year, she had a class that consisted mostly of students who didn't pass at least one of the twelve "levels" on a state exam. By the end of the year, all of her students passed, including a few who received outstanding marks in all levels.

SJKT Jalan Khalidi

Suburban | Public | PPD Muar | Muar, Johor, Malaysia | 132 students

Blended Program

Edtech: Hardware
Desktops: Windows
Laptops: Windows
Laptops: Netbooks
Edtech: Software
Frog VLE
Quizizz
Kahoot
Padlet
Teacher-created content
Program Overview
Year Launched: 2014
Blended Grades: D1–D6
Enrolled: 132
Blended Subjects
Malay Language
English Language
Tamil Language
Moral Education
Science
Mathematics
Music
Information & Communications Technology

Model Overview

Lab Rotation

Students at SJKT Jalan Khalidi use technology across multiple classes at least three times per week, on scheduled basis, in the school's ICT classroom. Each student uses a netbook to access the lesson materials, videos and exercises on the Frog VLE with their own login. The teacher introduces all materials such as videos and virtual worksheets to the whole class, which they can then access throughout on the VLE. They then engage in exercises from applications like Kahoot and Quizizz to gauge each student's understanding. All teachers (in the subjects listed below) prepare these lessons in the Frog VLE beforehand so that students can access all the material in and outside of the classroom.

Before exams, teachers collect student data from applications like Quizizz and use them to understand what they should review with each class back in their face-to-face classrooms outside of the ICT classroom. This data is also used to track overall classroom progress and report it to the district education offices.

Implementation Q&A

When you first implemented blended learning, why did you choose that particular model?

We started using this model of blended learning because we wanted to make learning more fun for students. After starting to use the technology a few years ago, we realized that although the games are very entertaining for students, they are actually learning the material. We've seen some students do better in their classes now that they are more engaged in their learning.

What's the one piece of advice you'd give to emerging blended-learning programs?

Don't ever stop learning and don't be afraid to ask questions. As a teacher, you're used to being the one who knows everything. When starting out with blended learning, you won't know everything, so it's important to not be ashamed to ask for help and learn from other teachers and even the students.

Other Notes

On Thursdays from 2–4pm, all teachers in the school meet to plan their lessons and to hold a PLC. Here, they will help each other troubleshoot their lesson plans, discuss best practices in the classroom, and share lessons learned from the past week.

SMK Methodist (ACS Sitiawan)

Urban | Public | PPD Manjung | Sitiawan, Perak, Malaysia | 1600 students

Blended Program

Edtech: Hardware
Laptops: Chromebooks
Edtech: Software
Frog VLE
Kahoot
Quizizz
YouTube
Math Tricks
Microsoft Office
Google Drive
Program Overview
Year Launched: 2017
Blended Grades: T1–T2
Enrolled: 600
Blended Subjects
Malay Language
English Language
Science
Mathematics

Model Overview

Lab Rotation & Flipped Classroom

SMK Methodist is one of 150 schools in all of Malaysia that have a Frog Classroom. These classrooms are uniform in design, with easily-movable tables and brightly-colored chairs, as well as a mobile laptop cart and air conditioning. Students rotate into the lab at least once per week for some subjects, along with their subject-matter teachers, according to a pre-set schedule.

Before class, teachers give students class materials (via the Frog VLE) to read or watch to introduce themselves to the subject of the day. When students are in the Frog Classroom, they review the material that they read or watched at home by asking the teacher questions. Teachers then give the students exercises that are either online modules or offline worksheets to start applying what they learned. Afterwards, students will test their knowledge by playing Kahoot or Quizizz, with the teacher explaining the answer after each questions.

In addition to uploading content and exercises onto the Frog VLE beforehand for students, teachers also must fill out daily Flipped classroom lesson plans. This template guides teachers through thinking of how the various learning modalities (whole class instruction, individual assignments, etc.) will help students learn more autonomously.

Implementation Q&A

When you first implemented blended learning, why did you choose that particular model?

We decided to use a Flipped classroom model of blended learning because we believe that this gives the student more autonomy over their learning. This is crucial in skill development because when students get to university, much of their learning will have to be done on their own. Therefore, we are trying to prepare our students for college and beyond.

What's the one piece of advice you'd give to emerging blended-learning programs?

The principal of a school must be an incredibly big supporter and leader of a blended-learning program. Teachers need guidance in all areas of program implementation—not just ICT training—in order to help students best. It also helps if the school has a PTA or Board of Governors support the program as well so that the program can be funded well and understood by all. When all this is done, blended learning can become part of the school culture.

Other Notes

SMK Methodist is very proactive in seeking help with their blended-learning program. They began this endeavor in the beginning of 2017 with two teacher workshops that focused on material and lesson plan preparation for three class sessions. They then engaged in a dialogue with Taylor Education Group, who advised them to follow a small pilot program protocol and to provide more teacher training, specifically for Flipped classroom. The pilot is being carried out this year and will include a mid-year report, as well as an end-of-the-year evaluation. They are, however, still figuring out what metrics they will be using to determine whether or not their program is successful.

SK Seri Bayu

Suburban | Public | PPD Manjung | Seri Manjung, Perak, Malaysia | 1000 students

Blended Program

Edtech: Hardware
Laptops: Chromebooks
Edtech: Software
Frog VLE, Quizizz, Kahoot, Zimmer Twins, GoAnimate, Edmodo, Schoology, Quora, Alice.org, Animoto, Socrative, Funbrain, Grockit, Padlet, Bitstrips, Prezi, Wikispaces, Teacher-created content
Program Overview
Year Launched: 2013
Blended Grades: D1–D6
Enrolled: 1000
Blended Subjects
Malay Language
English Language
Science
Mathematics
Electives

Model Overview

Lab Rotation

SK Seri Bayu is one of 150 schools in all of Malaysia that has a Frog Classroom. These classrooms are uniform in design, with easily-movable tables and brightly-colored chairs, as well as a mobile laptop cart and air conditioning. This classroom, as well as a second computer lab, is used by all teachers and all subjects to varying degrees; most teachers will use the computer labs 1-2 times per week, based on a set time table. Both labs are open during recess so that students can study.

Teachers create "sites" for each of their classes to access online content, including notes, activities, and exercises on the Frog VLE. Usually teachers take the pre-made content from the FrogStore and customize it slightly for their own classes. In other cases, teachers create their own content and share those site resources with one another. Once in the computer lab, students engage with the Frog VLE in various ways. First, they will watch a video as a whole class to introduce the topic of the day. Afterwards, they are given a chance to answer a question about the video content on the VLE, which the teacher can then respond to in real-time.

During their lab sessions, students can access online content and will also use offline modalities such as small-group work to deepen their learning. Then students will play Quizizz individually to test their knowledge of the material they learned. During this time, the teacher walks around the classroom to help troubleshoot any technical issues. The teacher then goes over each question with the whole class.

Students are so excited to study that they ask to play Quizizz games outside of class. After school hours teachers also respond virtually to questions that students post on the VLE.

Implementation Q&A

When you first implemented blended learning, why did you choose that particular model?

After piloting this blended-learning program with one teacher in 2013, we saw how effective it was in keeping the students awake and engaged in class. The following year, we had all teachers in the school start using it, and have seen not only an improvement in student engagement, but also in their academic grades: we give students monthly and mid-year tests to track results.

What's the one piece of advice you'd give to emerging blended-learning programs?

When starting to create your blended-learning program, be sure to see good examples of blended schools. Knowing of other programs can really help you to understand how to implement your own, and will also inspire you in many ways. Also, when pulling teachers into the program, do activities to involve them. If you show them how easy and fun things can be, they will be more willing to try it themselves.

SK Sikamat

Rural | Public | PPD Seremban | Seremban, Negeri Sembilan, Malaysia | 1300 students

Blended Program

Edtech: Hardware
Laptops: Chromebooks
Laptops: NetBooks
Edtech: Software
Microsoft Office
Google Apps
Plickers
Kahoot
Quizizz
Frog VLE
Teacher-created content
Program Overview
Year Launched: 2015
Blended Grades: D1
Enrolled: 100
Blended Subjects
Mathematics

Model Overview

Station Rotation

Students at SK Sikamat use technology in a computer lab, which is overseen by their teacher, as well as a designated ICT coordinator. This computer lab is setup with five round tables, each with five netbooks or Chromebooks. The teacher uses this model of blended learning once per week for each class and uses their time in the lab to better understand materials he needs to review with them in their traditional classes.

Within the computer lab period, based on their academic level, students are separated into groups and directed to sit at one of the five tables. Each table is a station, only two of which actually use technology: one station is dedicated to using Quizizz, while another uses FrogPlay. The remaining non-tech stations use worksheets to teach various aspects of the subject at hand, with one of these stations receiving special attention from the teacher, typically targeted at students who are struggling. The students have ten minutes to complete the activity at their station, after which they rotate to the next to do another task. Students who do not complete the activity at their station are allowed to remain until they are finished. When the students have gone through two rotations, the teacher then opens one Chromebook for each station/team to use in a game of Kahoot, in an effort to test for understanding.

Teachers prepare all materials beforehand and upload all content, including the materials they print out, to the Frog VLE. That way students maintain access to all materials—even those that they did not get to use in class. The teachers encourage students to login and complete the activities at home.

Implementation Q&A

When you first implemented blended learning, why did you choose that particular model?

One teacher, Yuslan, chose to set up his classroom in stations because the stations make it easier for him to personalize student learning. By separating students by academic level (based on midterm examinations) and preparing different activities for each group, he can meet more students where they are at and help them succeed using different learning experiences and modalities.

What's the one piece of advice you'd give to emerging blended-learning programs?

One of the best pieces of advice is to really prepare yourself by going to trainings. Seek out your own professional development in areas such as ICT, so that you can be confident in using technology in the classroom. When you do this, be sure to come back and help your fellow teachers to do the same; blended-learning programs can be very successful when teachers support and collaborate with each other.

Other Notes

SK Sikamat's blended-learning efforts are largely thanks to one motivated teacher, Yuslan, who has shared his enthusiasm and knowledge with his peers. Yuslan, by his own initiative, joined many teacher groups, including Google and Microsoft Education, in order to learn more about how technology can help in differentiation. After becoming part of these communities and becoming an expert in a range of technology tools, he started to hold small workshops at his school for his peers. At first, not many people came to them, and many teachers remained resistant to change. However, after starting applying Yuslan's techniques in their own classrooms and seeing how much more the students enjoyed learning, more and more teachers began attending these sessions and sought his help. Now he offers sessions for teachers in schools from around Negeri Sembilan and has created a small local community of innovative educators.

SMA Sultan Zainal Abidin

Urban | Public | PPD Kuala Terengganu | Kuala Terengganu, Terengganu, Malaysia | 771 students

Blended Program

Edtech: Hardware
Desktop:Windows
Edtech: Software
Frog VLE Kahoot Microsoft Office Teacher-created content
Program Overview
Year Launched: 2015 Blended Grades: T1, T3 Enrolled: 100
Blended Subjects
Mathematics English Language

Model Overview

Lab Rotation

The computer lab at SMA Sultan Zainal Abidin is set up with two long rows of desks in the middle of the room, with smaller desks on the sides of the room that hold two desktops each. Each student sits at a computer, with the teacher's computer at the front of the room.

To start their math class, students are tasked with reviewing material from past lessons by playing a short quiz game of Kahoot that is embedded into the Frog VLE. After this, students follow along with the teacher-led whole-class instruction using the presentation slides the teacher has prepared and uploaded into the Frog VLE. When they have done this, they work in partners to solve some exercises that are also contained on the platform. When this is done and the teacher has led a whole-class discussion on the answers, the students test their knowledge using the FrogPlay application. Data from these exercises informs teachers' lesson plan back in their non-lab classrooms.

The teacher who implements this lab rotation model prepares the content beforehand, usually making all of it herself. She encourages her students to give her feedback about the lessons through the classroom "parking lot" on the Frog VLE. Through this, she can adjust her future lesson plans for non-lab classes to contain more resources that are more effective for the students. She also encourages students from outside her class to come in after school to do FrogPlay not only to reach the school's goal KPI of Frog logins, but also to help reinforce material they've recently learned in their traditional classes.

Implementation Q&A

When you first implemented blended learning, why did you choose that particular model?

One SMA Sultan Zainal Abidin teacher started using technology in her classroom because it helped her to share content with her students, to grade their assignments, and to give them feedback in real-time. She also likes the fact that she can re-use lessons and doesn't have to worry about losing anything, because all of the information is in the cloud rather than in physical format.

What's the one piece of advice you'd give to emerging blended-learning programs?

Just try it. Have an open mind towards using the technology to not only help your students, but yourself as well. You might not be able to see the benefits at first, but it is well worth it in the long run.

SK Tok Dir

Suburban | Public | PPD Kuala Terengganu | Kuala Terengganu, Terengganu, Malaysia | 572 students

Blended Program

Edtech: Hardware
Desktops:Windows
Laptops:Chromebooks
Edtech: Software
Frog VLE
FrogPlay
Quizizz
Microsoft Office
Google Drive
Picara
YouTube
Teacher-created content
Program Overview
Year Launched: 2016
Blended Grades: D4
Enrolled: 100
Blended Subjects
Malay Language

Model Overview

Lab rotation & Station Rotation

SK Tok Dir is one of 150 schools in all of Malaysia that have a Frog Classroom. These classrooms are uniform in design, with easily-movable tables and brightly-colored chairs, as well as a mobile laptop cart and air conditioning. This Frog Classroom holds a set of laptops, whereas the school has another computer lab full of desktop PCs. Students rotate into the lab at least once per week for some subjects, along with their subject-matter teachers, according to a pre-set schedule.

When students first come into one of the computer labs, they choose to sit at one of five stations. The teacher first usually shows a video to the students on the projector to introduce the subject topic for the day. Students engage in a whole-class discussion, and also answer questions on the Frog VLE platform that relate to the video. When the teacher explains the answers to these questions, he then assigns students to separate station, (three of which use the Chromebooks), then gives them 5-7 minutes to complete their assignment, after which time they rotate to the station to the right. Students normally are able to complete their tasks at each station at their own pace, often within the class period.

Once students are doing activities in their stations, the teacher and a teaching assistant walk around the room to both troubleshoot the technology and address students' questions. Teachers also assign exercises for students to do at home, which then helps to determine if there are areas where students need more help in the following classes.

Beyond this Station Rotation model, other classes simply rotate into the lab at least once per week.

Implementation Q&A

When you first implemented blended learning, why did you choose that particular model?

We started implementing blended learning in these stations because not only is using the technology more fun and engaging for students, but they also are easier to control in these small groups. All students will end up doing all activities for the day, but because some activities are more individual and some require more teacher attention, the teacher is able to give more targeted assistance to students than they would if they were trying to teach to the whole class.

What's the one piece of advice you'd give to emerging blended-learning programs?

One big piece of advice is to give a lot of support to your teachers. Teachers, especially when being first introduced to the idea of blended learning, may have trouble with technology or don't have time to make all of their own content. That's why it's important for them to have good and consistent professional development that also helps to foster a sense of community and sharing among the staff.

Other Notes

When asked who are some of the main differences he sees between the blended-learning model(s) and a more traditional classroom, one teacher mentioned that the attendance in his class was increasing. Technology, he says, can make things more fun and engaging for kids, which in turn makes them want to come to class.

Appendix E: South African Case Studies

Diepsloot Combined School

Suburban | Public | Diepsloot, Gauteng, South Africa | 1800 students

Blended Program

Edtech: Hardware
Mobile phones
Edtech: Software
Everything Maths
Program Overview
Year Launched: 2017 Blended Grades: 10, 11, 12 Enrolled: 180
Blended Subjects
Mathematics Science

Model Overview

Flipped Classroom

At Diepsloot Combined School, technology is a precious commodity. While there isn't a school-wide effort to utilize the available technology resources for teaching and learning, one math and science teacher is taking it upon himself to maximize those resources to advance his students' learning. Nkateko Machumele, a first-year teacher for grades 8 through 12, started digital learning in his classroom with a program called Everything Maths, a gamified mobile learning platform for putting math concepts into practice.

Though cell phones are not permitted in class at his school, Machumele created a Flipped classroom model so that his grade 11 and 12 students could complete lessons and exercises on Everything Maths at their own pace and time outside of class. He tracks learners' progress on the platform in real time through the app's dashboard, which includes a breakdown of individual learners' exercises completed, level of mastery, speed versus mastery and the content they've covered on their own. The dashboard also allows learners to set goals for their learning, which Machumele monitors as well. As a teacher, he greatly appreciates having constant informal assessment.

In the classroom, twice per week, Machumele uses the data dashboard to divide the class into small groups for mixed ability peer learning. He brings other digital resources into class time like videos (especially for science experiments where they don't have the right materials available) and digital textbooks, shared with the whole class via either a Smartboard or projector.

Implementation Q&A

When you first implemented blended learning, why did you choose that particular model?

Machumele laments that the software, especially when it's accessed outside of school in the Flipped classroom model, can't answer students' questions in real-time. He tries to devote time each class to addressing questions learners may have had from Everything Maths. Additionally, there is hesitancy from school leaders about using mobile phones for learning and they won't bend to permit them during class time. Also, some of Machumele's learners don't have a cell phone.

Perhaps Machumele's greatest challenge is feeling isolated in this effort to incorporate digital learning in his classes. He says other teachers at his school prefer to retain the "chalk and talk" method and by and large are not leveraging the technology at the school (one projector, two Smart Boards, a laptop for every teacher, and a computer lab with desktops).

What's the one piece of advice you'd give to emerging blended-learning programs?

Machumele's advice to other educators hoping to start blended learning is to "go for it". It's another way to know your learners and make sure they are improving. He said that the existing education system assumes we are all teaching the same learners, and the same learners even as 50 years ago. He believes that today we are teaching technologically advanced learners who also have a shorter attention span. Yet considering these facts, teaching is not changing. With technology, learners can visualize what the teacher is saying - there is audio and visual learning happening for them. Technology can even save money and effort from the teacher when used thoughtfully.

Other Notes

Nkateko Machumele was first introduced to Everything Maths at a teacher workshop run by Siyavula, the edtech organization that created the mobile learning app. Siyavula aims to scale anytime, anywhere learning among students through direct outreach to schools and facilitating their implementation of the app in classrooms. Following regional teacher workshops on using Everything Maths in lessons, the Siyavula team tracks each participants' use of the platform with their students. According to Siyavula staff, Machumele has been one of the standout implementers. He said he's motivated to continue his blended math class by his students. "There was one student who was failing and considered at risk. But since she has been practicing extra [in the Flipped classroom model], she is making real progress," Machumele said.

Durban Girls' High School

Suburban | Public | Umlazi | Durban, KwaZulu Natal, South Africa | 1400 students

Blended Program

Edtech: Hardware
Tablets: Windows
Laptops: Windows
Desktops: Apple
Edtech: Software
Google Classroom
Teacher-created content
Quizlet
Autocrat
Program Overview
Year Launched: 2015
Blended Grades: 8–12
Enrolled: 200
Blended Subjects
Art

Model Overview

Flex

Durban Girls' High School began using technology within the art department, as they needed to integrate design software like Adobe. From there, the art teachers began to implement a blended-learning model that allowed students to access all of the course content online. In art courses, the teacher creates a two-week lesson with videos, reading materials and assignments built in through Google Classroom. During the art period, students direct their own time and workflow, working independently during class time to complete this playlist of tasks at their own pace and path.

Implementation Q&A

When you first implemented blended learning, why did you choose that particular model?

Blended learning has been a way for Durban Girls' High School to enrich students' school experience. It's also making teachers more efficient. One surprising result of blended learning: Integrating technology has improved transparency. With parents accessing students' work much more often, teacher feedback is now much more careful, detailed and professional, which benefits the learners a lot more. Teachers' quantitative feedback has increased as well now that assessment is less tedious to do.

What's the one piece of advice you'd give to emerging blended-learning programs?

Those who are innovators need to be good role models. Teacher Neith Moore tells others, try it and you'll wonder how you ever managed without it. "Preparation is so much easier and quicker now," Moore said. "We're now co-teaching with the students. The digital side allows for a lot of collaboration."

Other Notes

Head of the art department, Neith Moore has been a key instigator of blended learning at Durban Girls' High School. Though she's quick to say that the school principal Erica Hayes-Hill has been a crucial supporter of moving towards blended classes. While there's general sharing of practices among teaching staff, Moore has found a need to connect with "tech gurus" beyond the school walls in order to best improve blended practices at DGHS. She said one of her most important sources of learning has been online educator forums, in which she often chats with teachers from the United States or the United Kingdom. Moore then shares out tips and discoveries with her school colleagues during her one-on-one training sessions on blended teaching.

Future Nation Schools Fleurhof

Suburban | Private | Future Nation Schools | Fleurhof, Gauteng, S.A. | 200 students

Blended Program

Edtech: Hardware
BYOD tablets or laptops and mobile phones
Edtech: Software
Mathletics
Reading Eggs
Kahoot
Principal
Edmodo
Minecraft
Scratch
Self-created LMS
Program Overview
Year Launched: 2017
Blended Grades: 1–3
Enrolled: 200
Blended Subjects
Math
English Literacy

Model Overview

Station Rotation

Future Nation Schools use a Station Rotation model in both Math and Literacy. The model's stations include: a lesson/guided reading with the teacher, independent work, group collaboration, and computer (using programs such as Reading Eggs or Mathletics). While the experienced teacher leads the small-group lesson at one station, the academic advisor floats among the other station to monitor, support and answer questions.

Each grade has two teachers: one is an experienced, fully qualified teacher and the other is an "academic advisor" who may be a new teacher or someone studying for their qualifications. Together they co-teach and co-plan lessons and share the same open classroom space. Most of the day is spent sharing the class space but for certain subjects they may decide to divide into separate groups and roll out the wall divider. Projects are integrated in the learning across all subjects.

Implementation Q&A

When you first implemented blended learning, why did you choose that particular model?

Future Nation Schools worked closely with High Tech High, a school in California, to build its own blended and project-based learning model that fits the African context.

What's the one piece of advice you'd give to emerging blended-learning programs?

Plan for blended learning way upfront. Future Nation Fleurhof hired teachers in July and they went through a half-year of training before school started in January. Future Nation hires the misfits from the traditional environments. Or often people with non-teaching experiences, like entrepreneurs, who are more likely to think of new, practical applications of learning.

Know that your model is never perfect. But empower your teachers on the big vision. Co-create with teachers. Let them drive the tools they use. Ask teachers what's working and take them along on the journey.

Other Notes

Future Nation Schools is a network of low- to mid-fee private schools in Gauteng. The learning model is student-driven and the pedagogy is project-based. Culturally relevant learning is also emphasized across all subjects and African history, languages and cultures is thoughtfully woven into the student experience. The schools aim to prepare students to be leaders and entrepreneurs.

Embracing twenty-first century learning methods, First Nation Schools also integrate mobile phones into students' learning experience. S'onqoba Maseko, Chief Operations Officer, said that mobile learning encourages anytime, anywhere learning. "Instead of locking phones out of the classroom, we're thinking, how can we use them as an educational tool?"

Hatfield Christian School

Suburban | Private | Waterkloof Glen, Gauteng, South Africa | 700 students

Blended Program

Edtech: Hardware
iPads, BYOD, Desktop: Windows
Edtech: Software
Moodle LectorSA Hatfield Christian Online School
Program Overview
Year Launched: 2010 Blended Grades: 8–12 Enrolled: 100
Blended Subjects
Math Science

Model Overview

A La Carte

Hatfield Christian School got started in digital learning by launching an online school in 2009 supported by Canada's Heritage Christian Online School. It started as an offering to homeschooled students, however it has grown to be an offering to students enrolled full-time in the brick-and-mortar school. A La Carte students receive weekly teacher feedback in writing. They meet with teachers face-to-face on campus or on Skype as needed.

Implementation Q&A

When you first implemented blended learning, why did you choose that particular model?

We love blended education, most of all because students take a bigger responsibility for their learning. It's always an adjustment for them but they end up stronger, more confident and capable learners in the end.

What's the one piece of advice you'd give to emerging blended-learning programs?

Support learners along the way. It's often an adjustment for them, especially in grades 8 or 9, to independently drive their learning. Meet with students to help them develop skills like time-management that will make them stronger learners and keep them on track in their schoolwork. Also, for learners without internet at home, be sure they have a space to study online. Hatfield offers 90 minutes supervised after school for any students who wish or need to complete digital assignments.

Other Notes

In primary grades, Hatfield Christian School has also incorporated an online math curriculum into classroom learning. Primary math classes use Smart Boards to display Abacus by Pearson, with the whole class. The teacher then uses the online lesson and exercises to run each lesson and move students through the curriculum. Some students in grades 3 through 8 may also use LectorSA, an online English reading and comprehension support program—often at home with a teacher digitally tracking progress—as a tool to improve their fluency especially if they are non-native English speakers or just struggling with reading.

Nova Pioneer Academy: Jackal Creek

Suburban | Private | Nova Pioneer Academies | Jackal Creek, Gauteng | 100 students

Blended Program

Edtech: Hardware
Chromebooks
Edtech: Software
Mathletics
Reading Eggs
Google Classroom
Thrash
Program Overview
Year Launched: 2017
Blended Grades: R–1
Enrolled: 100
Blended Subjects
Math
English Literacy

Model Overview

Station Rotation

All lessons are inquiry-based and play-oriented at Nova Pioneer Academy. The teacher leads off each lesson by presenting a question to the class. Students spend the rest of class working together in various ways to answer the opening question. For both math and literacy, the teacher divides the class across three "centers" (or stations): two with a hands-on activity in which learners engage collaboratively to solve a problem, and one with Chromebooks where learners progress through a learning program - either Mathletics or Reading Eggs. The groups are differentiated by skill level. Typically the learners do not rotate through the stations on the same day; they complete one to two stations a day, working entirely at their own pace. All learners have the opportunity to work at the online learning station every other day. During station time, the teacher and a teacher apprentice float through the classroom to support learners and answer questions as they arise.

Implementation Q&A

When you first implemented blended learning, why did you choose that particular model?

Nova Pioneer Academy ensures centralized learning design. For first-year teachers, the school provides templates for lesson plans. This way teachers can focus on developing other classroom skills and there is a level of quality assurance.

The schools use the Cambridge Curriculum and Singapore math curriculum. For Nova Pioneer, blended learning facilitates a streamlined, consistently high-quality learning environment.

What's the one piece of advice you'd give to emerging blended-learning programs?

Provide a lot of teacher coaching and modeling. Nova Pioneer supports and guides teachers - many of whom are early in their career - to upscale their technology skills, gain confidence with instructional practices and effectively design learning centers for blended-learning time. Over the course of a term, teachers participate in one week of professional development.

Other Notes

Each classroom has a teacher and a teacher apprentice, who supports learning in stations. Students, however, are encouraged to collaborate and ask their peers for help before asking a teacher when they are struggling with a task or concept. Small-group learning stations in blended classrooms effectively facilitate Nova Pioneer Academy's inquiry-based, collaborative learning model.

Parklands College

Suburban | Private | Cape Town, Western Cape, South Africa | 1750 students

Blended Program

Edtech: Hardware
Tablets: Apple
Laptops: Apple
Edtech: Software
Parklands Intranet
GoFormative
Google Classroom
Kahoot
Socrative
Snapplify
iTunes U
Program Overview
Year Launched: 2010
Blended Grades: R–12
Enrolled: 1750
Blended Subjects
Math
English
History
Science
Foreign Languages
Life Skills
Art
Design
Robotics

Model Overview

Flex, Flipped classroom

Using the Substitution Augmentation Modification Redefinition (SAMR) model, digital learning is infused across the school in all grade levels and subjects. All textbooks are now digital and the curriculum is online. Learning is very much project-based and student-driven, creating a Flex environment for the students.

The IT Lab at the school was originally designed to instruct students on foundational computer skills and how to use specific applications like Microsoft Office or Adobe products. Now, however, the school has shifted the IT Lab to be a skill-building, collaborative work space that ties together learning across the curriculum. Students might create interdisciplinary projects, for example, uniting what they're learning in life skills course to drama and utilizing various computer apps along the way.

Across all classes, teachers embed the CAPS national curriculum into long-term projects. For example, within a two-month theme of Nazi Germany and Hunger Games, there will be history lessons but students will also write speeches, design maps in virtual reality and do team investigations. Teachers design the topics to align with the curriculum and aim to transform content delivery into an engaging, student-centered learning experience. All teachers' resources and lesson plans are shared with staff and students on the Parklands Intranet.

Implementation Q&A

When you first implemented blended learning, why did you choose that particular model?

The school wanted to connect learning to the real-world to make learning exciting and meaningful for students. By infusing digital learning and projects - even virtual and augmented reality - into the curriculum, the school puts the learning into the students' hands and they create something that is relevant and enriching for them.

What's the one piece of advice you'd give to emerging blended-learning programs?

Don't use technology for the sake of using it. Parklands College leaders and teachers agree that pedagogy comes first. Continuous staff development is critical to keep school exciting and innovative. The school will change with the times and will take feedback from students along the way. The staff is enthusiastic - and they get each other excited. All of Parklands' teachers have the chance to be trainers. Each can present a new approach, something they tried that worked well or that didn't. In this culture, they continually challenge each other.

Other Notes

To align with the schoolwide blended environment, Parklands College is shifting toward more flexible learning spaces. A new building on the secondary school campus is under construction and will be designed to be a large, open learning space, resembling a library more than a classroom - with group tables, nooks for online learning, couches, and most importantly, no walls. School leaders believe this shift in space will help further transform the learning process to be more interdisciplinary, collaborative and student-driven.

Sonwabo Primary School

Suburban | Public | Gugulethu, Western Cape, South Africa | 1010 students

Blended Program

Edtech: Hardware
Windows desktop
Android tablet
Prowise screen
Edtech: Software
Cami Math
MyCyberWall
GreenShoots
Talking Stories
Brain Quest
Program Overview
Year Launched: 2015
Blended Grades: 3–7
Enrolled: 800
Blended Subjects
Math

Model Overview

Lab rotation

Every math class spends an hour in the computer lab twice per week. In this Lab rotation model, about a quarter of a student's weekly learning time is spent on digital learning software. Learners work independently in the lab on math exercises that reinforce what they've worked on with the teacher and in the textbook during class. During regular class time outside of the lab, the teacher often divides students into groups based on their level for intervention and focused practice.

Implementation Q&A

When you first implemented blended learning, why did you choose that particular model?

Ten years ago the school received the computers for the school lab from the Western Cape department of education as part of the provincial e-learning program. The school views digital and blended learning as a route to improving student outcomes.

What's the one piece of advice you'd give to emerging blended-learning programs?

Try to acquire technological advances. The data gathered from these programs help you to make better decisions and plan for your class. The data is much more in-depth than what the teacher could otherwise gather.

Other Notes

Sonwabo Primary School's greatest challenge is funding to support its digital and blended learning program. The government provided the funding for the math program but the principal said the school is waiting for funds to expand the program to literacy as well. With limited funding, teacher training opportunities, specifically around instructional technology integration, have also been limited. The principal reported that theft has been a major concern for the school since acquiring technology. Security measures for protecting the technology are thus additional significant costs for the school and prohibitive to bringing in more technology to facilitate and grow the blended program.

SPARK Lynedoch

Rural | Private | SPARK Schools | Lynedoch, Western Cape, South Africa | 200 students

Blended Program

Edtech: Hardware
Chromebooks
Edtech: Software
Reading Eggs
ST Math
Illuminate Education
Google Classroom
Zearn Math
EdPuzzle
My CyberWall
They Can Code
Program Overview
Year Launched: 2014
Blended Grades: R–5
Enrolled: 200
Blended Subjects
Math
English Literacy
African language
Life Skills
Science

Model Overview

Model 1: Lab Rotation

SPARK Schools use a Lab rotation model in Grades R-3 (kindergarten to 3rd grade) during an extended instructional day. Students rotate through subject-based classrooms (English literacy, additional African language, math, physical education, and life skills) and the Learning Lab daily.

Classroom instruction includes whole group, guided work, and independent centers activities led by qualified teachers and does not include any integrated technology. The Learning Lab block consists of students utilizing adaptive, cloud-based software to practice either math or literacy. Blended Learning Facilitators monitor students on their Chromebooks and pull small groups of students requiring remediation for intensive tutoring sessions while in the Learning Lab.

Although Blended Learning Facilitators are responsible for monitoring student data on adaptive software and teachers are responsible for forming guided groups based on student assessment results, our current focus in the Schools Team at SPARK Support is to close the loop between the classroom and Learning Lab by using data from each to inform the other.

Model 2: Flex/Individual Rotation

The learning space is large and open and shared amongst an entire grade of students and various subject teachers and facilitators. For the first half of the day, students rotate between four, 35-minute learning stations: two are for teacher-led, small-group instruction, one is for independent learning and the fourth is online learning supported by a tutor/facilitator. At each station, packets of content and exercises are differentiated by student even within an already competency-based grouping. Students journal daily to reflect on their progress and core values as well as offer feedback to their teachers.

At the independent station, students choose what to work on and control the pace and path of their learning.

Implementation Q&A

When you first implemented blended learning, why did you choose that particular model?

The mission of SPARK Schools is to provide globally competitive education at an affordable cost. When SPARK co-founders Stacey Brewer and Ryan Harrison first researched educational models, they were drawn to blended learning as a way to lower costs while increasing academic quality. Brewer and Harrison visited Rocketship Education and were impressed with the Lab rotation model employed in their elementary schools and settled on a version of this Lab rotation model when they opened their first school in January 2013.

In July 2015, a Flex/Individual Rotation pilot was prompted by a demonstration of personal responsibility and high student engagement in Grade 4 students at SPARK Ferndale, the first school in the SPARK Schools network. The model was implemented across the network in January 2016 after a successful pilot.

What's the one piece of advice you'd give to emerging blended-learning programs?

Include multiple stakeholders in the design and implementation of blended learning. By seeking feedback from students, staff, and parents, SPARK has increased investment in its original Lab rotation model and has successfully piloted and launched a Flex/Station Rotation model. Buy-in from all involved stakeholders eases the pain of change management.

Other Notes

Social-emotional skills are also a key emphasis at SPARK. SPARK's core values include Service, Persistence, Achievement, Responsibility, and Kindness. These values are upheld in the classroom, in the Learning Lab, during play and in the community. Every day, students repeat the SPARK Schools Creed, a daily promise that summarizes these core values and reminds students what it means to be a SPARK scholar. Teachers and tutors discuss these core values with students throughout the school day and work with families to implement them at home.

Streetlight Schools: Jeppe Park Primary

Urban | Private | Streetlight Schools | Johannesburg, Gauteng | 100 students

Blended Program

Edtech: Hardware
Chromebooks
Edtech: Software
Reading Eggs
Program Overview
Year Launched: 2017 Blended Grades: 1–2 Enrolled: 100
Blended Subjects
English Literacy

Model Overview

Lab Rotation

A literacy teacher and a reading/writing teacher collaborate to plan and execute daily blended lessons. Students spend one block per day with each teacher as well as a 30-minute block three days per week in the computer lab doing literacy exercises on Reading Eggs. The more experienced teacher's class focuses on basic skills training, and the less experienced co-teacher or "tutor" facilitates learners through the Workshop Model, learning time designed for differentiated projects, teamwork and student-driven exploration. Both teachers view the dashboard of student data from Reading Eggs at least weekly to get a complete view of each learner's progress and challenges. The teachers then use this data to provide targeted face-to-face practice for individual students during the reading/writing or literacy block.

Implementation Q&A

When you first implemented blended learning, why did you choose that particular model?

The school features many open, shared learning spaces and transparent walls to foster a culture of openness and encourage learning of all kinds, such as play and exploration and collaborative learning. It made sense to integrate a digital learning environment as well, as Streetlight Schools wants each student to develop the skills they will need to grow into leaders in their communities and in South Africa.

What's the one piece of advice you'd give to emerging blended-learning programs?

For one, blended learning is useful for adding a quality academic block to an extended school days without significantly adding to costs. Going forward, consider how digital learning more generally can help your school in four key ways:

- Personalization. All learners get to practice and learn at their own speed.
- Learner-driven environment: For older students, teachers can include time in the day for individual students to pursue their own interests via digital resources.
- Data: technology is an effective means to monitor students' progress as well as communicate successes on a common platform and compare results over time.
- Standardization: It's important that all students are familiar with digital learning. In South Africa, for example, there's a massive digital learning divide.

Other Notes

Streetlight Schools started as an afterschool learning program for public school students in Johannesburg. That program was an opportunity to pilot blended learning. The program actually launched with a rotational model but the leaders saw mixed results among students. Streetlight Schools has since tweaked and developed its pedagogical approach which now centers around the Workshop Model. With the support of the Click Foundation, a South African nonprofit that helps primary schools integrate online learning for math and literacy, Streetlight started its Lab rotation model to reinforce the learning that happens during Workshops. Melanie Smuts, founder and CEO of Streetlight Schools, talked about the importance of teachers in a blended model. "Integrating technology is an inherently human-intensive process," Smuts said. "Teacher development is critical. Innovative and committed people are necessary to effectively build tech into a system."

Zilungisele Primary School

Rural | Public | Ilemba District | Hangush, KwaZulu Natal, South Africa | 680 students

Blended Program

Edtech: Hardware
Tablets: Windows
Desktops: Windows
Edtech: Software
Edoki Academy
Mwabu
Learn to Create
My Cyberwall
Program Overview
Year Launched: 2016
Blended Grades: 1–9
Enrolled: 200
Blended Subjects
Math
Literacy

Model Overview

Lab Rotation

Each classroom has the opportunity to use tablets two days per week based on a timetable for sharing the technology between foundation phase (grades 1-3) classes. On days when the tablets are used, the teacher introduces a topic (often a review from the previous day's lesson for the students). The teacher demonstrates the concept on a Smartboard or projector connected to her tablet. All students then receive a tablet to practice in a learning app, such as Edoki Academy for math. Students all use the same program at the same time, but they move through the exercises at their own pace. Meanwhile, the teacher floats through the classroom to facilitate. After 30 minutes of practice on the tablet, the students typically put their learning on paper, sometimes as an exit ticket, so that the teacher can check for understanding (the programs on the tablet do not collect data). The teacher asks students to share with the class what they practiced.

The school also uses a Lab rotation model for Grades 4-9 Math and Science in which students rotate into a computer lab.

Implementation Q&A

When you first implemented blended learning, why did you choose that particular model?

Zilungisele started this effort to ensure that its students are computer literate and prepared for tomorrow's world. But the school found other positive results. There's now more teamwork among teachers. What one teacher discovers others want to try, too. Teachers share both resources and strategies. Students also don't miss as much school anymore. Since using tablets in class, school leaders report that absenteeism is significantly lower. "There isn't anything the students don't like in the form of an iPad," the principal said.

What's the one piece of advice you'd give to emerging blended-learning programs?

Students easily understand what they discover for themselves. Digital learning helps students to be actively involved in learning and more independent. It then makes classroom management very simple, too.

Other Notes

Zilungisele Primary School was among five schools that participated in a five-year school improvement pilot program by the MPG Foundation and JET Education Services. The program not only funded and supported the school to integrate digital learning in classrooms but also partnered with school administrators and teachers to create ongoing professional development opportunities. Mentor-educators with significant experience in school transformation, as employees of MPG and JET, also work extensively with each school to enhance the quality of teaching and learning. The success of the blended learning program thus was very much linked to the efforts to improve the school environment overall.

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Julia leads the Christensen Institute team that educates policymakers and community leaders on the power of disruptive innovation in the K-12 and higher education spheres through its research. She has published and spoken extensively on trends in the EdTech market, blended learning, competency-based education, and the future of schools. Before joining the Institute, Julia worked for NewSchools Venture Fund, a nonprofit venture philanthropy firm that invests in education entrepreneurs. Julia holds a BA from Princeton University and a JD from Yale Law School.

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Katrina has interviewed numerous teachers and administrators to help with the development of the Christensen Institute Blended Learning Universe Directory. She also co-authored State of Opportunity, a survey-driven report on the status and direction of blended learning in Ohio. Before joining the Institute, Katrina wrote for 2U Inc.'s international relations blog and was an assistant editor for Morocco World News, an online news provider. She dedicated much of her college career to studying abroad and learning languages, including Portuguese, Arabic, Russian, French, and Spanish. Katrina holds a BA in Political Philosophy with minors in Arabic and Near Eastern Studies from Princeton University.

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Jenny has been instrumental in the development of the Christensen Institute Blended Learning Universe Directory, having interviewed teachers and administrators across the United States. Previously, Jenny worked as a program assistant for Alwaleed Islamic Studies at Harvard University, where she helped organize events and digital resources. She spent the past two years teaching English as a foreign language, first at Ureki Public School in the Republic of Georgia and later in the nonprofit sector in Mexico. Jenny holds BA degrees in International Relations and French from Tufts University.

About Christensen Institute

The Clayton Christensen Institute for Disruptive Innovation is a nonprofit, nonpartisan think tank dedicated to improving the world through disruptive innovation. Founded on the theories of Harvard professor Clayton M. Christensen, the Institute offers a unique framework for understanding many of society's most pressing problems. Its mission is ambitious but clear: work to shape and elevate the conversation surrounding these issues. The Institute is redefining the way policymakers, community leaders, and innovators address the problems of our day by distilling and promoting the transformational power of disruptive innovation.

About WISE

world innovation summit for education
مؤتمر القمة العالمي للابتكار في التعليم

An Initiative of Qatar Foundation

The World Innovation Summit for Education was established by Qatar Foundation in 2009 under the leadership of its Chairperson, Her Highness Sheikha Moza bint Nasser. WISE is an international, multi-sectoral platform for creative, evidence-based thinking, debate, and purposeful action toward building the future of education. Through the biennial summit, collaborative research and a range of on-going programs, WISE is a global reference in new approaches to education.

The WISE Research series, produced in collaboration with experts from around the world, addresses key education issues that are globally relevant and reflect the priorities of the Qatar National Research Strategy. Presenting the latest knowledge, these comprehensive reports examine a range of education challenges faced in diverse contexts around the globe, offering action-oriented recommendations and policy guidance for all education stakeholders. Past WISE Research publications have addressed issues of access, quality, financing, teacher training, school systems leadership, education in conflict areas, entrepreneurship, early-childhood education, and twenty-first century skills

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References

Arnett, T., Benson, A., Bridges, B., Bushko, K., Duty, L., & Mohammed, S. (2015). *State of opportunity: The status and direction of blended learning in Ohio*. Retrieved June 28, 2017, from http://learningaccelerator.org/media/abc5d315/Ohio%20Report%20101415_F.pdf

Bailey, J., Schneider, C., & Vander Ark, T. (2013). *Navigating The Digital Shift: Implementation Strategies for Blended and Online Learning*. Digital Learning Now. Retrieved July 24, 2017, from http://www.klhoffman.net/uploads/2/3/2/1/23218472/dln-ebook-pdf.pdf

Barbour, M. et al. (2011). *Online and Blended Learning: A Survey of Policy and Practice in K–12 Education Around the World*. iNACOL. Retrieved July 21, 2017, from https://www.inacol.org/wp-content/uploads/2015/02/iNACOL_a-survey-of-policy-and-practice.pdf

Bunge Foundation (2012). *Learn Some Facts About Education in Brazil*. Retrieved from http://www.fundacaobunge.org.br/en/news/news.php?id=11422&/learn_some_facts_about_education_in_brazil

Chan, F. M. (2002). *ICT in Malaysian Schools: Policy and Strategies*. Educational Technology Division, Ministry of Education, Malaysia. Retrieved from http://www.share4dev.info/kb/documents/3513.pdf

Christensen, C. M., Horn, M. B., & Staker, H. (2013). *Is K–12 Blended Learning Disruptive?: An Introduction to the Theory of Hybrids*. Retrieved June 28, 2017, from Clayton Christensen Institute website: https://www.christenseninstitute.org/wp-content/uploads/2014/06/Is-K-12-blended-learning-disruptive.pdf

Comitê Gestor da Internet no Brasil. (2014). *TIC Educação 2013: Pesquisa Sobre O Uso Das Tecnologias De Informação E Comunicação Nas Escolas Brasileiras*. Retrieved from http://www.cetic.br/media/docs/publicacoes/2/tic-educacao-2013.pdf

De Moraes, C. (2014). *Education at a Glance 2014: Brazil*. OECD. Retrieved from https://www.oecd.org/brazil/EAG2014-Country-Note-Brazil.pdf

Department of Basic Education. (2012). *Implementation Strategy for E–Education in South Africa, 2013–2025*. Retrieved from http://www.bridge.org.za/wp-content/uploads/2014/12/ICTs-DBEpercentE2percent80percent99s-New-E-Education-Strategy-Presentation-Nov-2012.pdf

Department of Basic Education. (1997, July). *Language in Education Policy*. Retrieved from http://www.education.gov.za/Portals/0/Documents/Policies/GET/LanguageEducationPolicy1997.pdf?ver=2007-08-22-083918-000

Department of Basic Education & Department of Telecommunications and Postal Services (2016). *Provision of ICT in Schools*. Retrieved from https://pmg.org.za/committee-meeting/22096/

Department of Higher Education & Training in South Africa. (2015). *Statistics on Post–School Education and Training in South Africa: 2013*. Retrieved from http://www.dhet.gov.za/DHETpercent20Statisticspercent20Publication/Statisticspercent20onpercent20Post-Schoolpercent20Educationpercent20andpercent20Trainingpercent20inpercent20Southpercent20Africapercent202013.pdf

Emerging Strategy. (2016, September 13). *Malaysia Government Policy Driving Rapid Growth of Private and International School Enrollment*. Retrieved from http://www.emerging-strategy.com/article/rapid-growth-of-private-and-international-schools-in-malaysia-driven-by-government-policy-is-an-attractive-short-term-growth-opportunity/

Freeland, J. and Hernandez, A. (2014). *Schools and Software: What's Now and What's Next*. Charter School Growth Fund and Christensen Institute. Retrieved from https://www.christenseninstitute.org/wp-content/uploads/2014/06/Schools-and-Software.pdf

Gedye, L. (27 May 2016). *"Paperless Classroom Hasn't Taken Off Yet."* Mail & Guardian. Retrieved from https://mg.co.za/article/2016-05-27-00-paperless-classroom-hasnt-taken-off-yet

Hall, K. (2016) *"Children's Access to Education." South African Child Gauge 2016*. Children's Institute, University of Cape Town. Retrieved from http://www.ci.org.za/depts/ci/pubs/pdf/general/gauge2016/Child_Gauge_2016-children_count_education.pdf

Hall, M. (2014, September 30). *'Teachers not footballers' needed by Brazil*. BBC News. Retrieved June 28, 2017 from http://www.bbc.com/news/business-29331958

Hanushek, E. and Woessmann, L. (13 May 2015). *Universal Basic Skills: What Countries Stand to Gain*. OECD Publishing. Retrieved from http://www.oecd.org/edu/universal-basic-skills-9789264234833-en.htm

Horn, M. & Mackey, K. (2011) *Moving from inputs to outputs to outcomes: The future of education policy. Retrieved June 28, 2017, from Clayton Christensen Institute website: https://www.*christenseninstitute.org/publications/moving-from-inputs-to-outputs-to-outcomes/

Horn, M. and Staker, H. (2015) *Blended: Using Disruptive Innovation to Improve Schools. San Francisco, California: Jossey-Bass.*

IBIS Capital. (2013). *Global e-Learning Investment Review.* Retrieved from http://www.ibiscap.com/index.php/insights-research/

IBIS Capital. (2016). *2016 Global EdTech Industry Report: A Map for the Future of Education.* Retrieved June 28, 2017, from http://ecosystem.edtechxeurope.com/2016-edtech-report

INEP. (2011). *2011 Higher Education Census.* Retrieved from https://acei-global.blog/2013/06/13/10-facts-about-the-education-system-of-brazil/

Isaacs, S. (June 2007). *ICT in Education in South Africa.* Survey of ICT and Education in Africa: South Africa Country Report. Retrieved from http://www.infodev.org/infodev-files/resource/InfodevDocuments_429.pdf

Isac, M. M., da Costa, P. D., Araújo, L., Calvo, E. S., & Albergaria-Almeida, P. (2015). *Teaching Practices in Primary and Secondary Schools in Europe: Insights from Large-Scale Assessments in Education.* Luxembourg: Publications Office of the European Union. Retrieved from https://crell.jrc.ec.europa.eu/sites/default/files/files/JRC95601.pdf

Kozma, R. B. (2003). *Technology and Classroom Practices.* Journal of Research on Technology in Education, 36(1). Retrieved June 28, 2017, from http://www.tandfonline.com/doi/abs/10.1080/15391523.2003.10782399

Liu, O. P., Selvadurai, S., Saibeh, B., Radzi, M. M., Hamzah, S. A., & Hoon, O. P. (2013). *Tracking the Pathways of Education in Malaysia: Roots and Routes.* Asian Social Science, 9(10). Retrieved from http://dx.doi.org/10.5539/ass.v9n10p93

Mackey, K., & Watson, J. (September 19, 2015). *Proof Points: Blended Learning Success in School Districts.* [Blog post]. Retrieved June 28, 2017, from Clayton Christensen Institute website: https://www.christenseninstitute.org/publications/proof-points/

Malakolunthu, S., & Rengasam, N. C. (2017). *Policy Discourses in Malaysian Education: A Nation in the Making.* New York, NY: Routledge.

Mekhitarian, S. (2016, September 13). *4 tips for developing effective professional development for blended learning [blog post].* Retrieved from https://www.christenseninstitute.org/blog/4-tips-for-developing-effective-professional-development-for-blended-learning/

Ministry of Education Brasil. (2014). *Censo Escolar da Educação Básica 2013 Resumo Técnico.* Retrieved from http://download.inep.gov.br/educacao_basica/censo_escolar/resumos_tecnicos/resumo_tecnico_censo_educacao_basica_2013.pdf

Ministry of Education Malaysia. (2015). *Malaysia Education Blueprint 2013-2025 (Preschool to Post-Secondary Education).* Retrieved June 19, 2017, from http://www.moe.gov.my/index.php/en/dasar/pelan-pembangunan-pendidikan-malaysia-2013-2025

"More children attending no fee schools: survey". (2015, 27 May). *South African Government News Agency.* Retrieved from http://www.sanews.gov.za/south-africa/more-children-attending-no-fee-schools-survey

Mouton, N, Louw, G.P. and Strydom, G.L. (November 2012) *A Historical Analysis of the Post-Apartheid Dispensation Education In South Africa (1994-2011). International Business and Economic Research Journal.* Retrieved from https://www.cluteinstitute.com/ojs/index.php/IBER/article/viewFile/7369/7437

NationMaster. "Malaysia Education Stats." Retrieved from http://www.nationmaster.com/country-info/profiles/Malaysia/Education/All-stats

OECD. (2013). *PISA 2012 Results in Focus: What 15-year-olds know and what they can do with what they know.* Retrieved from https://www.oecd.org/pisa/keyfindings/pisa-2012-results-overview.pdf

OECD. (2015). *Students, Computers, and Learning: Making the Connection.* Paris, France: OECD Publishing. Retrieved June 28, 2017, from: http://dx.doi.org/10.1787/9789264239555-en

OECD. (2016). *Programme for International Student Assessment (PISA) Results from PISA 2015.* Retrieved June 28, 2017, from https://www.oecd.org/pisa/PISA-2015-Brazil.pdf

Paixão, M., Carvano, L. M., & Rossetto, I. (Fall 2010). *Educational Performance and Race in Brazil.* Americas Quarterly. Retrieved June 28, 2017, from http://www.americasquarterly.org/node/1895

Patrick, S., Kennedy, K. and Powell, A. (2013, October). *Mean What You Say: Defining and Integrating Personalized, Blended and Competency Education.* iNACOL. Retrieved from https://www.inacol.org/wp-content/uploads/2015/02/mean-what-you-say-1.pdf

Perlman-Robinson, J., Winthrop, R., & McGivney, E. (2016). *Millions Learning: Scaling up Quality Education in Developing Countries*. Washington, D.C.: Brookings Institution. Retrieved from https://www.brookings.edu/wp-content/uploads/2016/04/FINAL-Millions-Learning-Report.pdf

Pierce, A. (2013). *Decentralization and Social Policy in Brazil: An Analysis of Health and Education Policies of the New Republic*. Journal of International Affairs. Retrieved June 28, 2017, from https://jia.sipa.columbia.edu/online-articles/decentralization-and-social-policy-brazil-analysis-health-and-education-policies-new

Plano CDE, & Omidyar Network. (2017). *Learning from Parents and Students to Improve Education In Brazil*. Retrieved from https://www.omidyar.com/sites/default/files/file_archive/Plano_CDE_Report_English_.pdf

Powell, A. and Patrick, S. (2006). *An International Perspective of K–12 Online Learning: A Summary of the 2006 NACOL International E–Learning Survey*. North American Council for Online Learning. Retrieved July 21, 2017 from http://files.eric.ed.gov/fulltext/ED514433.pdf

Raab, Erin and Arushi Terway. (2010.) *School Fees in South Africa: Increasing Quality or Decreasing Equality?* USAID. Retrieved from https://www.epdc.org/sites/default/files/documents/Schoolpercent20Feespercent20inpercent20Southpercent20Africa.pdf

Sander, F. G., Jalil, I. N., & Ali, R. (2013). *Malaysia Economic Monitor, December 2013: High–Performing Education*. Bangkok, Thailand: The World Bank.

Senkevics, A. (2012, September 30). *Desigualdades de gênero e cor/raça na Educação Básica no Brasil*. [Blog post]. Retrieved June 28, 2017, from Ensaios de Gênero website: https://ensaiosdegenero.wordpress.com/2012/09/30/desigualdades-de-genero-e-corraca-na-educacao-basica-no-brasil/

Shezi, Lungelo. (2016, March) *South Africa Institute of Race Relations: Only 4 in 10 public schools have a computer facility. Htxt*.Africa. Retrieved from http://www.htxt.co.za/2016/03/07/sairr-only-4-in-10-sa-public-schools-have-a-computer-facility/

Spaull, N. (2013) *South Africa's Education Crisis. Centre for Development and Enterprise*. Retrieved from https://nicspaull.files.wordpress.com/2011/04/spaull-2013-cde-report-south-africas-education-crisis.pdf

Staker, H. and Horn, M. (2012). *Classifying K–12 Blended Learning*. Innosight Institute. Retrieved July 21, 2017 from https://www.christenseninstitute.org/wp-content/uploads/2013/04/Classifying-K-12-blended-learning.pdf

The Star. (2017, March 10). *Malaysia has most students in international schools in SEA*. Retrieved from http://www.thestar.com.my/news/nation/2017/03/10/malaysia-has-most-students-enrolled-in-international-schools-in-region/

The World Bank. (2014). *Pupil–teacher ratio in primary education (headcount)*. UNESCO Institute for Statistics. Retrieved from http://data.worldbank.org/indicator/SE.PRM.ENRL.TC.ZS?locations=BR

UNESCO. (2015) *Education for All 2015 National Review Report: Brazil. Retrieved from http://unesdoc*.unesco.org/images/0023/002300/230021e.pdf

U.S. Department of Education, Office of Educational Technology. (2011). *International Experiences with Educational Technology: Final Report*. Washington, D.C.

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