ONLINE LEARNING™ CONSORTIUM

K-12 Online Learning in Saudi Arabia

COVID-19 IMPACT STUDY - II
AN ONLINE LEARNING DEVELOPMENTAL STUDY WITH LEARNING MANAGEMENT SYSTEM CONTEXT ANALYSIS

An evaluation of online learning, its tools, and the satisfaction of stakeholder groups to provide strategic guidance to enhance student learning.

K-12 Online Learning in Saudi Arabia

Overview

Quality of online learning is a priority for the Kingdom of Saudi Arabia. As the COVID-19 pandemic and public health concerns continue to require emergency remote instruction and learning online across the globe, educators and students continue to persevere through the new normal acquiring new skills to teaching and learning online and accessing technological and support resources to assist them. To ensure that high quality online learning is being offered in the future, the Kingdom of Saudi Arabia commissioned phase two of a study to understand the state of online learning and to gauge the satisfaction of stakeholder groups: students, parents, teachers, and school administrators.

The intention is to benchmark satisfaction over time while also determining challenges and opportunities for improvement while marking areas of excellence that could be highlighted against an evaluation framework for quality online learning. The findings and recommendations of this report can provide strategic guidance to help decision making to enhance programming within the Kingdom of Saudi Arabia to improve the overall student learning experience. This is particularly aided by the inclusion of analysis into the Madrasati learning management system (LMS) tool that supports successful digital learning in remote and online contexts.

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Executive Summary

The Kingdom of Saudi Arabia swiftly moved its K-12 education programs and services online in response to the COVID-19 pandemic. To ensure quality online learning was offered, the Kingdom commissioned a developmental study to understand the state of online K-12 education during the fall 2020 semester and begin visioning the post-COVID environment. The intention was to determine opportunities for improvement while identifying areas of excellence that could be highlighted against an evaluation framework for quality K-12 online learning. As an outcome of the initial study, key recommendations were made. As a follow-up, this developmental study was conducted to analyze the progress made on the recommended initiatives and measures the satisfaction of key stakeholders, challenges, as well as the opportunities for future investment against the dimensions of that National eLearning Center's (NELC) comprehensive online learning evaluation framework.

The Phase I study chiefly affirmed that the pandemic required rapid acceleration in the development and delivery of fully online courses for a high volume of students. These requirements were piled atop the needs already articulated in the nation's ambitious *Vision 2030* agenda for education. The Saudi Ministry of Education quickly extended its research focus to all areas of the K-12 education sector in an attempt to drive deeper into how to improve outcomes around key areas of online learning quality associated with Vision 2030. Based on Phase I findings and recommendations, more than 70 new initiatives were launched and implemented by the Ministry.

A total of 385,957 members of the Saudi Arabia education community (students, parents, teachers, and administrators) participated in this follow-up study. Data was collected through qualitative and quantitative surveys. Updated themes and trends emerged from this study and provide a clear picture of the strong progress made.

Key Themes and Areas of Notable Progress

Teaching and Learning

- Design, navigation, and organization of the classes
- Content and materials in the classes
- Assessments, feedback, and grading of student learning
- Accessibility
- Online teaching
- Online learning
- Collaborations and interactions among student peers
- Student engagement and learning

Communication

- Communication and interactions between students and teachers
- School communication with students
- School communication with parents
- Teacher communication with parents

Technology and Human Infrastructure

- Educational technologies used in classes
- Technology support and resources
- Learning support and resources
- Training and orientation to online learning
- Teaching support

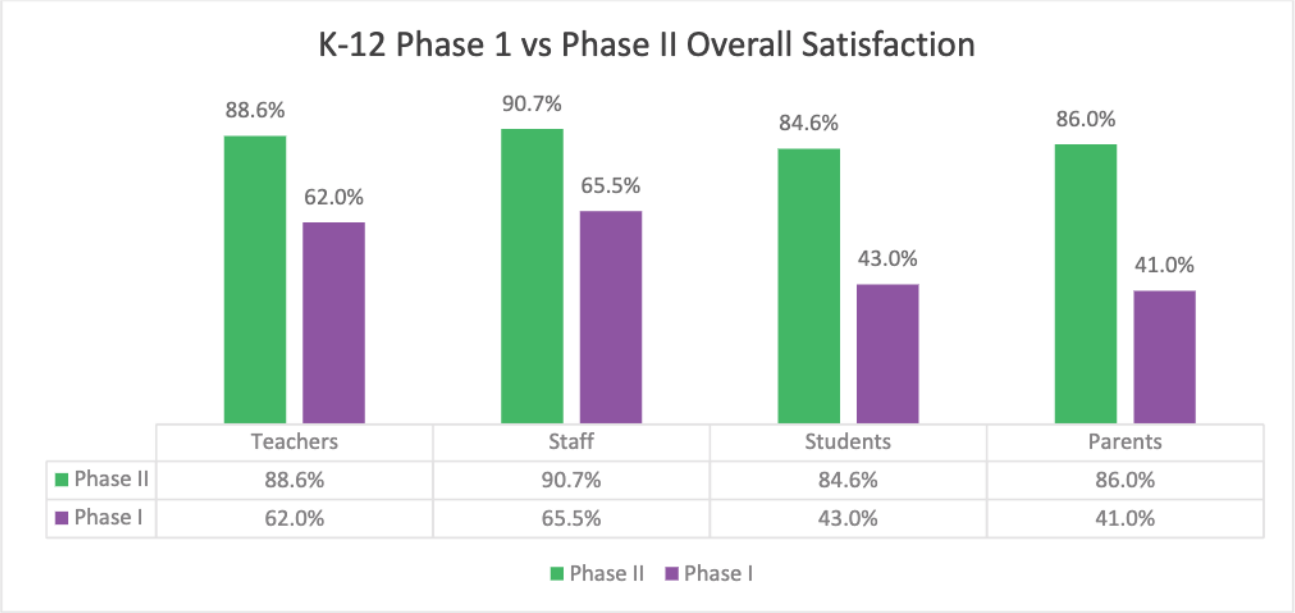
Leadership

- Policy
- Operations

High Level of Satisfaction and Progress Indicated

Overwhelmingly students, parents, teachers, and principals report satisfaction with the online learning in response to COVID-19 global pandemic resulting in emergency remote instruction and learning at a distance. Notably, from Phase I to Phase II, all four stakeholder groups participating in the study demonstrated a substantial increase in overall satisfaction, with each group reporting satisfaction rates above 80%. In particular, students' satisfaction nearly doubled during Phase II, from 43% in Phase I to more than 85%.

The majority of students, parents, teachers, and principals reported satisfaction with their school's online education when asked about their overall satisfaction. Parents were also satisfied with learning support and resources, as well as communication from teachers and schools. Students and parents also felt strongly about students' active involvement in classes and the amount of work they completed. They reported strong agreement in statements regarding the quality of the student experience online and the learning opportunities presented to them by their teachers. In fact, across every dimension of the NELC Online Learning Evaluation Framework, stakeholder responses (where applicable) indicated satisfaction above 50%, and frequently far above. In this way, the entire survey indicates broad support and satisfaction for the efforts within the Kingdom in responding to COVID-19, as well as support for expansion of online learning beyond the pandemic. Further, internal benchmarking across demographic groups within the data reveal internal consistency of support and satisfaction with current online learning efforts.



Acknowledgement of Online Learning Efficiency

Additionally, all stakeholder groups believed that classes were run more efficiently by the teachers after moving to an online learning environment. Stakeholders felt that their online and onsite experiences are comparable and recommend continuing online learning. Respectively, majority of students report that online classes have comparable outcomes to onsite classes, learning that takes place online is comparable to learning that takes place in the onsite classes, they learn as much in my online classes as they would have if the class had been offered face-to-face, and that they are able to successfully complete all of their work after moving online. Parents do report that online classes have comparable outcomes to onsite classes and that learning that takes place online is comparable to learning that takes place in the onsite classes.

Improved Digital Literacy Skills

Among the most promising areas of growth and satisfaction regarding online learning from an administrator perspective during the COVID-19 pandemic concerned the remote shift's impact on digital literacy (use of digital tools, ability to work in digital environments). An impressive 93.9% of principals/staff identified improvement in students' skills and 95.7% of principals/staff saw improvement in teachers' skills. These indicators are strong and suggestive of the opportunity of digital learning to continue informing and playing a role in the holistic education landscape of Saudi Arabia in the post-pandemic world.

Online Learning as a Strategic Choice for the Future

The results from evaluation and continuous improvement survey indicators suggest there is a body of reflective practitioners overseeing learning inclusive of digital modalities. These educators collected data and reported satisfaction with student performance in the online medium. Educators were generally not opposed to the expansion of online learning and perhaps most important, the majority of students and parents would recommend that their school strategically expand online learning in the future, and if given the opportunity, students report that they look forward to learning online again. Over 80% of administrators and teachers indicated that their strong agreement that if given the opportunity, they would look forward to offering fully-online instruction at their schools again.

Madrasati as a Leader of Internally-Developed Platforms

Given that all K-12 education in the Kingdom went online using the Madrasati Learning Management System (LMS) Platform during the fall 2020 semester, an additional study component sought to measure the satisfaction of LMS use during Phase I & II. Findings from the study report high degrees of satisfaction across stakeholder groups.

Historically, education ministries and governments across the international community tended to formally adopt LMS less frequently at the national levels, often as a measure of cost savings and practical implementation. While decisions to adopt LMS in K-12 have most often been made at a local level rather than at a state or national level, the pandemic did spur some nations to establish LMS or contract with commercial vendors to expand access to online

learning. Furthermore, many nations sprang into action to support continuity in learning for students by establishing content and resource material repositories through a distribution model.

The establishment of the Madrasati LMS stands out in the domain of global education, both in terms of its robust capabilities for delivering online learning, as well as its proliferation across the entirety of the K-12 education spectrum in KSA. In the analysis that follows, the features of Madrasati lead the way for internally developed LMS platforms among other nations, and Madrasati compares favorably with the leading commercial LMS providers. This analysis explored the e-learning solutions developed as a response to COVID in approximately 174 countries. After review of the international landscape, Madrasati is relatively peerless related to other nations' efforts to implement a countrywide LMS for e-learning in the K-12 education sector.

Challenges and Opportunities for Investment

Although there were high levels of satisfaction for all components of online learning in survey instrumentation, the lowest area for students was technology support and resources. Teachers and parents, although above average levels of agreement, also report slightly lower levels for technical support. Principals, too, report lower levels of agreement with statements regarding availability of technical staff to support the learning environment and the technology needs of teachers. While principals felt that there are adequate policies and procedures to support online learning, developing new policies and providing resources to ensure technology access, including laptops and Internet access, as well as appropriate support are critical to future strategic planning to ensure quality. Teachers report that a top area investment should be made in teacher professional development training and teacher incentives.

Recommendations

To ensure quality in online education, the findings and expert review of this body of data inform a series of propositions to guide decision-makers and suggest resources for future strategic planning and continuous improvement efforts. Among these findings are:

- Ensure students have access to a laptop, Internet, and a supportive study environment.
- Provide strategies for skill building for students and parents in time management, organization, and technology work productivity applications through an online learning readiness intervention.
- Implement professional development for online teaching with teacher incentives to improve use of time and engagement of students.
- Update policy, regulations, and standards to support high quality online learning.

Recommendations for future developments for the Madrasati platform and online learning in KSA include mobile device support, nationwide broadband infrastructure and device support expansion, adaptive learning and analytics support, and expanded teaching training and support.

This study was coordinated by The National e-Learning Center (NELC) of the Kingdom of Saudi, in partnership with the Online Learning Consortium (OLC). NELC was established as an independent entity by the Council of Ministers of Saudi Arabia, and aims to enhance trust in eLearning programs, lead innovation in learning and digital transformation, and to enable the integration among educational institutions and labor market needs in the Kingdom of Saudi Arabia. The OLC, established in 1999 by the Sloan Foundation, is a collaborative community of higher education leaders and innovators, dedicated to advancing quality digital teaching and learning experiences designed to reach and engage the modern learner - anyone, anytime, anyplace.

In partnership with the Online Learning Consortium (OLC), a global leader with a vast network and expertise, this Phase II Developmental Study was launched in late 2020 and early 2021. OLC is the lead of this project with assistance of several key partners from around the world. The study's international advisory board included the UNESCO Institute for Information Technologies in Education, the World Bank, the International Council for Open and Distance Education (ICDE), the International Society for Technology in Education (ISTE), the Association for Learning Technology (ALT), European Distance and eLearning Network (EDEN), and the DETA Research Center. Partners informed the study from launch to conclusion advising on the study design and recommendations.

Reviewing Organization: International Council for Open and Distance Learning (ICDE) Reviewer: Ebba Ossiannilsson

Reviewing Organization: International Society for Technology in Education Reviewer: Brandon Olszewski

Reviewing Organization: UNESCO Institute for Information Technologies in Education, Reviewer: Natalia Amelina

Introduction

In the midst of a global pandemic that is slowly moving to the post-inoculation phase, students and educators are actively participating in remote emergency instruction and learning while slowly gaining the appropriate knowledge, skills, and resources to be successful in this new normal.

The commitment to learning during a global pandemic has taken an emotional and financial toll on students, parents, teachers, and administrators. While all stakeholder groups are working to improve learning experiences and to ensure strategic planning in allocating resources and services to move towards high quality online learning, the Kingdom of Saudi Arabia has commissioned this Phase II Developmental Study to understand the state of online learning during COVID to gauge stakeholder satisfaction across the areas of the quality framework, including leadership, design and planning, online teaching and learning, technology, training and support for students and teachers, and continuous improvement.

In initial efforts, the Kingdom of Saudi Arabia commissioned a study to understand the state of online learning pre-, peri- and post-COVID. The intention was to determine opportunities for improvement while identifying areas of excellence that could be highlighted against an evaluation framework for quality online learning. Using this information, all K-12 education programs within the Kingdom of Saudi Arabia would be positioned to make improvements to the overall student learning experience. With the COVID-19 pandemic disrupting education across the globe in early 2020, many educators found themselves rapidly transitioning to remote learning without the appropriate knowledge, skills or resources.

The current study highlights current practices, informs strategic decision making, guides allocation of resources to overcome barriers to quality, and identifies investments to enhance the quality of the online learning experience for students. Using this information, schools within the Kingdom of Saudi Arabia will be positioned to make improvements driven by the data, research, and findings of this study to improve students' learning experiences, increase instructional effectiveness of teachers, and ensure efficient and effective operations and support services for schools. Investments will be strategic and data driven to overcome barriers to online learning excellence.

387,957

Total surveys accessed
Total voices influencing analysis of K-12 education

The report has two primary components and includes several appendices. The first section introduces Phase II Developmental Study research framework concerning online learning satisfaction and benchmarking, as well as its findings and recommendations for future online teaching and learning in the Kingdom of Saudi Arabia. The second section details the context for and nationwide launch of the Madrasati LMS across K-12 schools, as well as benchmarking across the international community and recommendations for future LMS innovations.

Within each section, contexts, frameworks, and findings are detailed, as well as recommendations based on the findings herein. Collectively, these research entities connected with a total of 385,957 members of the Saudi Arabia education community*.

With regards to this report's structure, each component is similar. This **introduction** provides context for the study. An **executive summary** provides an overview of the areas of study. The **context and framework section** for each situates this research into earlier findings from Phase I into COVID educational response in the Kingdom of Saudi Arabia. This also details the organizing principles of quality online education to which schools and institutions are presently aligning and measuring their work.

The **methodology and findings section** includes a summary of the analysis of each aspect of the surveys administered in the study. The **recommendations section** provides an interpretation of the findings and propositions. Finally, the **next steps** closing discusses a summary of overall findings and the future of education holistically and as a result of this incredibly rich compilation of research.

It is of chief strategic advantage that research and analysis into the satisfaction and comparative outcomes of online learning generally occurred at the same time as the Kingdom of Saudi Arabia's (KSA) Madrasati learning management system (LMS) international benchmarking study. As an LMS is a primary organizing tool and driver of the online learning experience, the features and status of nationally established and supported e-learning technology platforms for K-12 education offer incredible insight into the efficacy of digital learning.

* 191,308 reviewed and provided feedback in some form in support of the Online Learning Satisfaction and Benchmarking Study commissioned by NELC and the OLC and 196,649 participated in the LMS Study sponsored by the Digital Transformation Unit of the Saudi Arabia Ministry of Education.

As ministries of education and governing bodies across the world have expanded their e-learning resources and supports for teachers and students as a result of the COVID-19 pandemic, so has the need to understand the effectiveness and scale of the efforts nations have made. KSA's Madrasati platform, which has been internally developed within the country and its education ministry, has been launched and scaled in ways that differentiate it from other internally developed and commercially developed LMS platforms. Thus, discussion of the Madrasati platform seeks to benchmark KSA's progress in launching the Madrasati, as well as a comparison to responses across the globe.

It should be noted that the KSA's response to the COVID-19 pandemic, particularly in the realm of virtual learning toward e-learning has not emerged wholly sui generis. Efforts to support high quality education and e-learning, have been a strategic emphasis for the Kingdom of Saudi Arabia for some time. As the OECD (2020) noted in its report *Education in Saudi Arabia*, KSA has "committed to an ambitious cross-sectoral reform agenda" in its Vision 2030 goals to promote human capital, with education leading the way toward a more prosperous economy (p. 3). Thus, even prior to the ongoing global COVID-19 pandemic and disruption caused by the rapid transition to online and distance learning, Saudi Arabia was innovating with its emphasis on online learning. As an example, KSA has launched iEN, a broadcast network that includes more than 23 channels that provide ubiquitous educational content and programming for learners across the nation. Over the past year, many of these lessons have been hosted on YouTube for asynchronous viewing and access. The Ministry of Education has also begun to digitize curriculum across the country, enabling teachers and learners to access that content via computing devices and smartphones. Broadly, learners, teachers, supervisors, school libraries, and learning resource centers have all benefited from these efforts.

KSA has "committed to an ambitious cross-sectoral reform agenda" in its Vision 2030 goals to promote human capital, with education leading the way toward a more prosperous economy

-(p. 3). OECD (2020), Education in Saudi Arabia

These efforts to expand e-learning have continued during the pandemic, particularly in relation to the LMS. For the beginning of the 2020 school year, KSA launched the Madrasati *("My School"* in Arabic) learning management system to better facilitate virtual learning. In its first semester of launch, the use data from the Ministry of Education shows more than 6 million students and more than half a million educators using the platform to provide e-learning amid the pandemic (Saudi Ministry of Education, 2020). The platform is an internally developed LMS and bears much of the same functionality and performance that most education authorities find in outside vendors and commercial LMS providers.

Analysis of the Madrasati platform within the context of international LMS adoption during COVID-19 seeks to understand the following outcomes to better inform educators, administrators, and ministry leadership in further development of quality e-learning for K-12 education in KSA:

- Increase understanding of the changes taking place in K-12 education post-pandemic across the globe;
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- Provide evidence of the progression of institutional and instructional practices in response to COVID-19 with strategic forethought to provide access, support, and instruction to students remotely;
- Create a comparative analysis of the national platform in the Kingdom of Saudi Arabia as compared to international platforms; and
- Report on differences in technological infrastructure functionality, use of technological features, and the influence of technology infrastructure on administration, and teaching and learning practices.

Context and Framework

Purpose and Background

This report represents Phase II of an ongoing strategic partnership and research commitment to study, understand, and continuously improve the state of online learning in the Kingdom of Saudi Arabia during and after COVID-19, as well as a benchmarking analysis on the Madrasati LMS implemented nationwide in K-12 schools for the Fall 2020 Semester. The Phase I report published in October 2020, The State of Online Learning in the Kingdom of Saudi Arabia: A COVID-19 Impact Study for K-12, shared a data-driven analysis of stakeholder perceptions across the Kingdom of Saudi Arabia's K-12 education sectors in order to identify areas of excellence and determine opportunities for improvement.

Findings from the first study indicated the pandemic required rapid acceleration in the development and delivery of fully online courses across for a high volume of students. In addition to existing needs related to the nation's ambitious *Vision 2030* agenda for education, findings also further illuminated critical needs to support success. The Ministry quickly extended its research focus on all areas of the K-12 education sector to hone in on key discoveries from Phase I and push deeper analysis into how to improve outcomes around key areas of online learning quality associated with Vision 2030.

The Phase I Development Study areas of interaction and improvement helped refine the NELC Online Learning Evaluation Framework, which organizes analysis of the elements of quality online learning. This framework has further been used to group and organize the research design, instrumentation, and subsequent findings of both the COVID-19 Phase I and Phase II Development Study. Quantitative and qualitative survey measurements were taken and findings were analyzed thematically with respect to the evaluation framework. The dimensions of online education quality when grouped accordingly helps measure performance tied to recognized online education best practices. The framework is further defined, applied, and aligned in quality standards measuring multiple applications of online learning for institutional, programmatic, and school-level self-assessment and continuous improvement strategic planning through the leadership of the National eLearning Center (NELC) in Saudi Arabia.

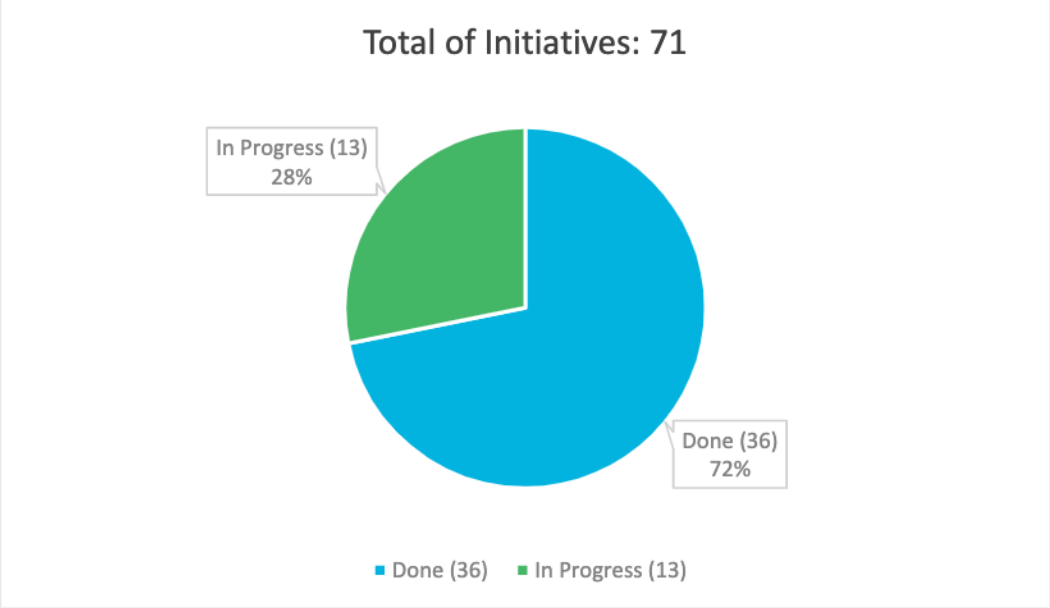
NELC's Online Learning Evaluation Framework

Framework Dimension	Framework Subdimensions and Topics
Leadership	Governance, Strategies, Policies, Processes, Resource Allocations, Periodic Review & Updating
Curriculum Design & Planning	Instructional Design Methods & UDL, Alignment with Standards, Course Syllabi, Course Materials & Content
Online Teaching & Learning	Communication, Engagement, Expectation Setting, Outcomes, Course Interaction, Feedback, Resources
Assessment	Assessment Strategies, Assessment Processes, Assessment Methodology, Assessment Types
Technology	Operability, Centralized Online Education Infrastructure (SSO, LMS, etc.), Modality, Security, ITSM Compliance, Internet Access, Reliability, Coverage
Student Support	Student Orientation & Support, Equity, Accessibility, Compliance Standards
Training Support	Technical Assistance, Professional Development, Orientation, Mentoring
Evaluation & Continuous Improvement	Student Satisfaction, Teacher Satisfaction, Staff Satisfaction, Evaluation of Course Outcomes and Program Quality

Based on the findings and recommendations from Phase I of the study, more than 70 new initiatives have been launched and implemented by the Ministry of Education. See Appendix A for a full listing of these initiatives and their correspondence to the framework elements above, as well as their implementation status at the time of this publication.

K-12 Initiatives Achievement

K-12 Study – Phase 1
Level of Achievement for Initiatives



Number of Initiatives According to Dimensions

	Leadership	Curriculum Design	Online Learning and Teaching	Assessment	Technology	Student Support	Orientation and Training	Continuous Development	Total
Done	5	3	6	4	13	8	6	6	51
In Progress	2	3	5	2	4	3	1	0	20
Total	7	6	11	6	17	11	7	6	71

Research Context

Leadership Readiness

Dimension One

The first key dimension of the initial study centered on leadership readiness for digital learning with particular emphasis on pre-planning and response to the COVID-19 global pandemic. Overall findings indicated strong agreement from administrators, staff, and teachers that leadership subdimensions of governance, strategy, and policy are in place to support quality online learning throughout the Kingdom. These findings were further supported by the OECD report *How the COVID-19 Pandemic is Changing*

Education: A Perspective from Saudi Arabia, in their finding that schools were well-positioned to manage the pandemic, though internet access was a concern. With respect to processes, resource allocation, and innovation, there was also broad agreement from these stakeholders, yet an opportunity to more equitably allocate resources, pursue process improvement, and open innovation opportunities. Such questions were mined explicitly across K-12 stakeholder groups in this research to surface progress.

Curriculum Design and Planning

Dimension Two

The second dimension of this research concerned curriculum design and planning. This area mined into all key aspects of digital learning design and pedagogy which precedes any aspect of instructional delivery. Specifically, instructional design methods such as universal design for learning (UDL), use of explicit learning objectives, alignment, course materials and content, and innovation were reviewed. A high degree of readiness regarding curriculum design and planning was observed in overall survey results, potentially due to existing efforts to increase online education in K-12 environments as well as the curriculum responsibilities of the Ministry. Study results did suggest that despite this readiness prior to the pandemic, the shift to emergency remote teaching revealed pedagogical considerations across this dimension that were not evident, or perhaps not necessary for curriculum prior to COVID. Survey recommendations included the opportunity to more explicitly support student readiness and continuous improvement given a broader scale of digital learning use and involvement for schools, teacher, and students alike. While much progress has been made, these factors remain items keyed in on by stakeholders as continuing opportunities within the Phase II Development Study's recommendations.

Online Teaching and Learning

Dimension Three

The Online Teaching and Learning dimension of Phase I research measured seven subdimensions including Communication, Engagement, Expectation Setting, Outcomes, Course Interaction, Feedback, and Innovation. Readiness in online teaching and learning, like previous dimensions, reflected preparedness pre-COVID, with both increases in some areas post-COVID that indicated prompt attention to needs and new needs illuminated by the pandemic. Of particular note regarding a need for increased readiness moving forward in this dimension were course interaction and feedback. Findings related to online teaching and learning indicated that there were slight increases in the communication, engagement, and course interaction subdimensions, and slight decreases in outcomes and feedback post-COVID. These elements are critical to online teaching and learning, and these slight increases suggest that stakeholders may have made changes to support students online following the pandemic. Recommendations included a number of items that support continuous improvement in online teaching and learning, and provided a solid foundation for increasing effectiveness and capacity headed into this Phase II research. Data-driven decision making was among the chief factors cited as a recent emphasis and success amidst the global pandemic. Continued investment in resources that amplify continuous improvement cycle processes for schools and institutions and the professional development that arms teachers with deepened skill sets and fluency with digital pedagogy are of paramount importance.

Assessment

Dimension Four

The assessment dimension measured four subdimensions including assessment strategies, assessment processes, assessment methodology, and innovation. Findings related to readiness for assessment in a fully-online environment indicated overall agreement, though at a lower rate and with more neutral responses than other aspects of the initial research. Survey and interview results showed that there was agreement with regard to the communication, understanding, and implementation of online assessment. However, teachers were not prepared to complete course assessments in this environment, and results further suggested that in order to ensure readiness for effective assessment practices online, clear expectations and agreement should be established regarding strategies, processes, and methodology to adequately measure learning. Phase II research explicitly tackled unanswered questions associated with initial assessment impressions including teacher and administrator concerns about academic integrity in online assessments, teacher advocacy for online assessment procedures, and progress towards online exams that would cement greater confidence and alignment in assuring and measuring students' digital learning outcomes.

Technology

Dimension Five

Core to successful digital learning is planning for and the readiness of a strong technology backbone. This dimension measured centralized online education infrastructure, operability, modality, security, information technology service management (ITSM) compliance, internet access, reliability, coverage, and innovation. Prior to COVID-19, there were clear needs related to technology that were planned for in long-range online education plans. Post-COVID, demands on technology increased, and survey and interview results showed that although the areas represented in the technology dimension were not fully prepared for the shift, improvements were and continue to be planned and implemented. Of particular note in this sub dimension, increasing the capability of centralized infrastructure to manage high-volume use, ensuring security related to student data and privacy, and making improvements to internet access, reliability, and coverage, including both network and device challenges, were all needed to ensure readiness in upcoming terms. Consistent through Phase II analysis, the areas of internet access, reliability, coverage, and operability remain challenges and understandably so as plans and efforts to scale up are midstream. These remain vital as without an accomplished technology disposition across all subdimensions, students may lack the resources needed for successful remote learning.

Student Support

Dimension Six

With perhaps equal importance to what is actually taught online (digital pedagogy) are considerations of and provision of online student services. These reinforce, maximize, and facilitate quality online and digital learning and stem the digital divide from students working and learning in a remote fashion. Considerations include student orientation and support, equity, accessibility, compliance, social emotional learning, and innovation. In Phase I of research, overall findings indicated a high level of awareness among administrators, staff, and teachers regarding holistic student support needs. Both quantitative and

qualitative data findings showed that while there were clear needs for improvement in all subdimensions, robust on-site services were previously implemented and there are innovative ideas and processes in development to extend these support services to students in a digital environment.

In the further development and implementation of appropriate and effective student support, the most evident gaps were between administrators, staff, and teachers and parents/students. Additionally, there was a need for increased assessment of needs and communication to parents and students regarding the availability of support. Some schools had already engaged in addressing these needs, and the recommendations for this have carried forward to presently recommended solutions for further development and improvement.

Training and Support

Dimension Seven

The Training and Support dimension concerns areas including technical assistance, professional development, orientation (Student & Parent), mentoring, and innovation. Training and support readiness appears to have been commensurate with the pace of online learning development and delivery in a pre-COVID environment. Post-COVID, sufficient resources exist for prior needs and actions have been taken to build upon training and support initiatives continued or launched during COVID. Overall findings indicated that school administrators, staff and teachers were satisfied with the relative activities and opportunities provided. School administrators, staff and teachers agree or strongly agree, suggesting continued focus and attention in this area are on track.

Evaluation and Continuous Improvement

Dimension Eight

Finally, the Evaluation and Continuous Improvement dimension delves into the evaluation of course outcomes and program quality, student satisfaction, teacher satisfaction, staff satisfaction, and innovation. Respondents indicated that improvements to readiness are needed regarding evaluation and continuous improvement. Areas requiring the most attention following Phase I concerned the evaluation of course outcomes and program quality, including the development and implementation of clear processes and metrics, and process implementation of student satisfaction measures. Both teacher and staff satisfaction increased following COVID, though recommendations were provided to further improve the ability to collect and constructively use feedback. Survey questions focused on evaluation and continuous improvement were included for administrators/staff, teachers, parents and students. Qualitative data from interviews was also obtained from administrators/staff and teachers. These efforts have been extended through Phase II, leading to specific and updated findings and recommendations.

Scope and Methodology

Phase II Developmental Study

Against the backdrop of the Phase I study and findings and with respect to the NELC Online Learning Evaluation Framework for measuring quality online and digital learning adopted by the Ministry of Education in the Kingdom of Saudi Arabia, this Phase II report and study addresses stakeholder satisfaction across multiple pinpointed areas of the quality framework, assessing updated status and continued needs and focus regarding leadership, design and planning, online teaching and learning, technology, training and support for students and teachers, and school and institutional continuous improvement.

Drawing on the eight dimensions and subdimensions of the NELC Evaluation Framework and previous data, four new descriptive surveys were developed…

The recommendations resulting from Phase I survey analyses provided information to support capacity and quality in online education throughout the country to enhance the potential for Vision 2030 excellence in a diversified and knowledge-based economy. Drawing on the eight dimensions and subdimensions of the NELC Evaluation Framework and previous data, four new descriptive surveys were developed for K-12 principals/staff, teachers, parents, and students by DETA and OLC in November and December 2020.

Survey instrumentation was developed based on a scan of other instrumentation and tools, including national and international products, literature, and recent research relevant to the dimensions and subdimensions. Survey items were developed to measure the participants' attitudes, opinions, and beliefs about online learning at their institutions, to assess the performance of the institutions and different functions of the institutions to support online learning and quality, and to identify areas of challenge and opportunities for improvement in future academic terms. All survey items are considered to have both construct and content validity.

The survey was delivered through NELC Survey Tool and was designed as a single instrument with branching logic to ease data collection and dataset management. Items were individually coded by stakeholder group and dimension for analysis and storage. Survey distribution was requested through the Ministry of Education in January and February 2021, who provided the survey link to other administrators, staff, teachers and students. Survey analysis commenced in February and March 2021 and included descriptive statistical analysis completed in SPSS, disaggregated by stakeholder group (administrators/staff, teachers, and students) as well as by dimension.

Learning Management System (LMS)

For the LMS benchmarking section, data compiled and analyzed through this project are sourced from publicly available datasets, secondary analysis of publicly available reports and analyses, and academic and popular press research on comparative and international education and educational technology implementation, as well as educational technology market reporting. Data reporting also comes from press releases, white papers, and social media posts from commercial vendors and official government publications. In total, this analysis explored the e-learning solutions developed as a response to COVID in approximately 174 countries.

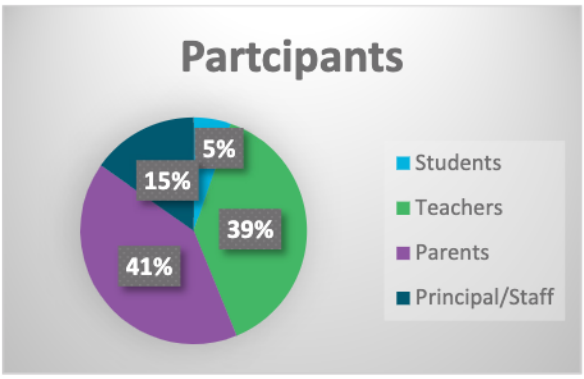
It is worth acknowledging at the outset that much of the reporting in this analysis is based on available insights primarily from wealthier or more developed nations, where the technological and governing or educational infrastructure was able to provide or procure e-learning solutions that included LMSs as a component of their transition to remote teaching and learning. In many countries, the extent to which e-learning solutions were made available to learners is incomplete. Where developed national response plans have been made available, many countries' early responses to the pandemic indicated that searching and planning for national e-learning platforms was underway but were not yet operational.

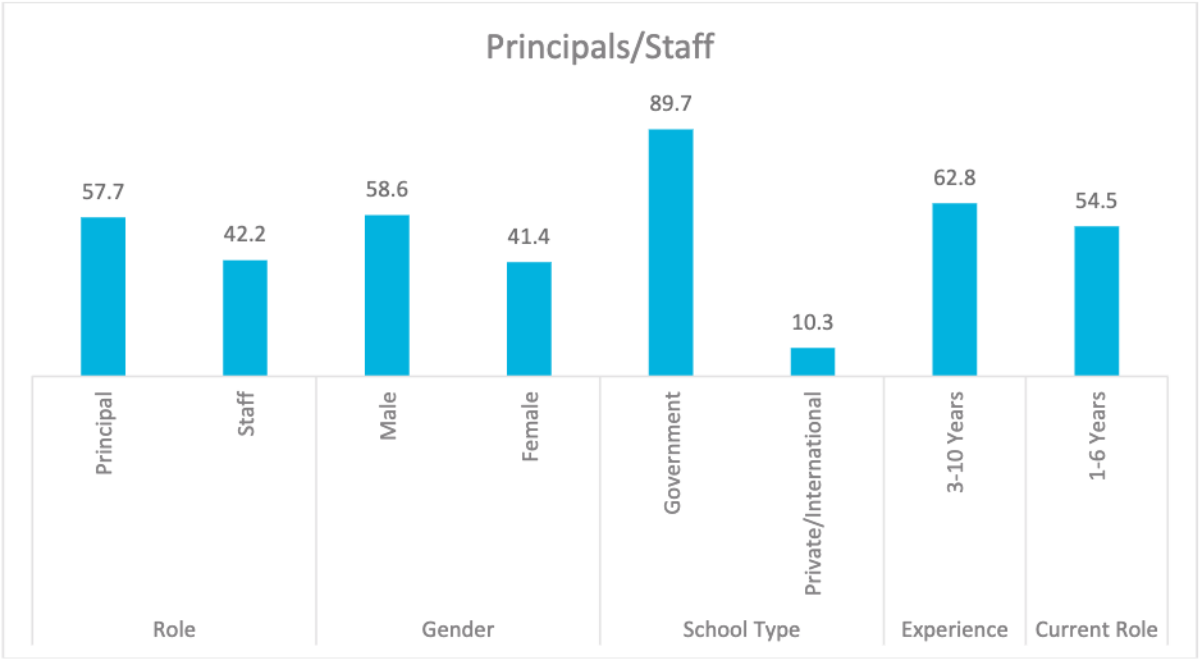
This analysis also includes information on strategic guidance for LMS implementation and usage, as well as promotional materials, from a number of LMS providers and vendors. All information from these analyses is used for benchmarking and comparison purposes and should not be intended as an endorsement for any particular learning management system, nor its parent company.

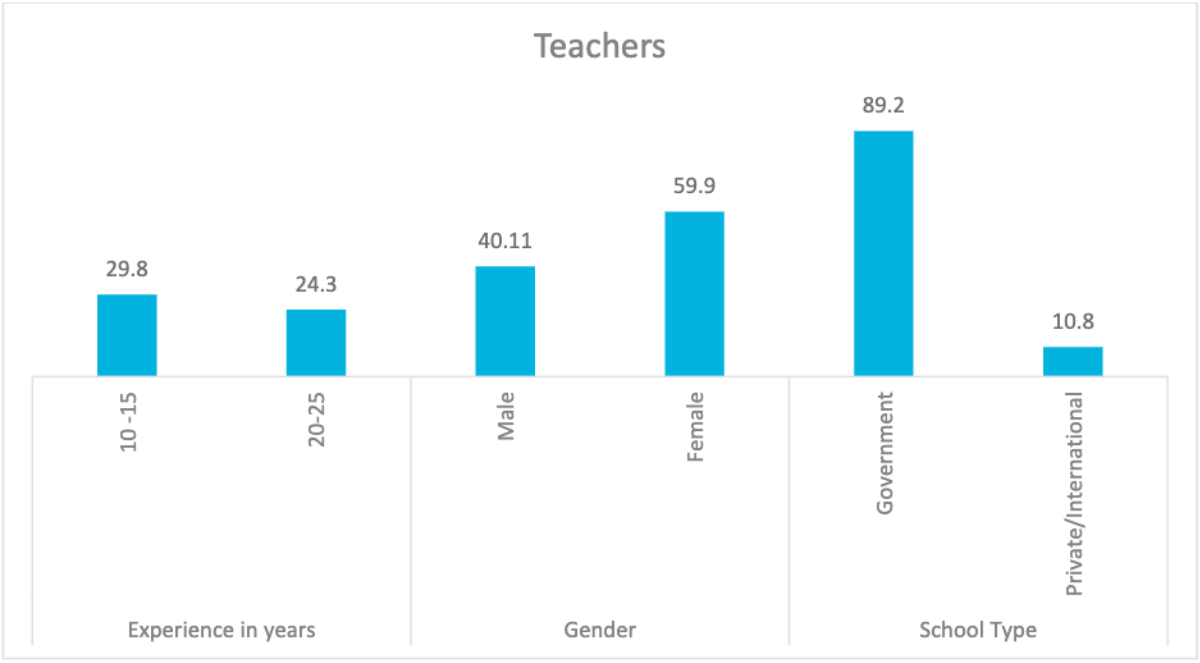
Participant Profile

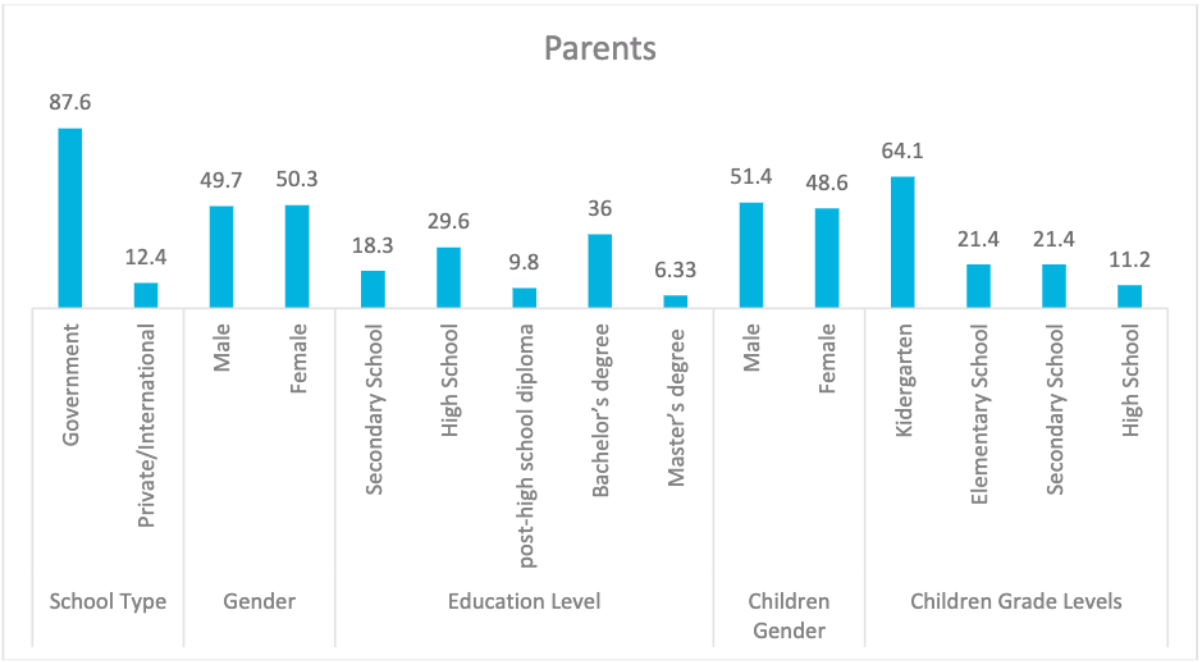
+ 191K
Number of completed surveys

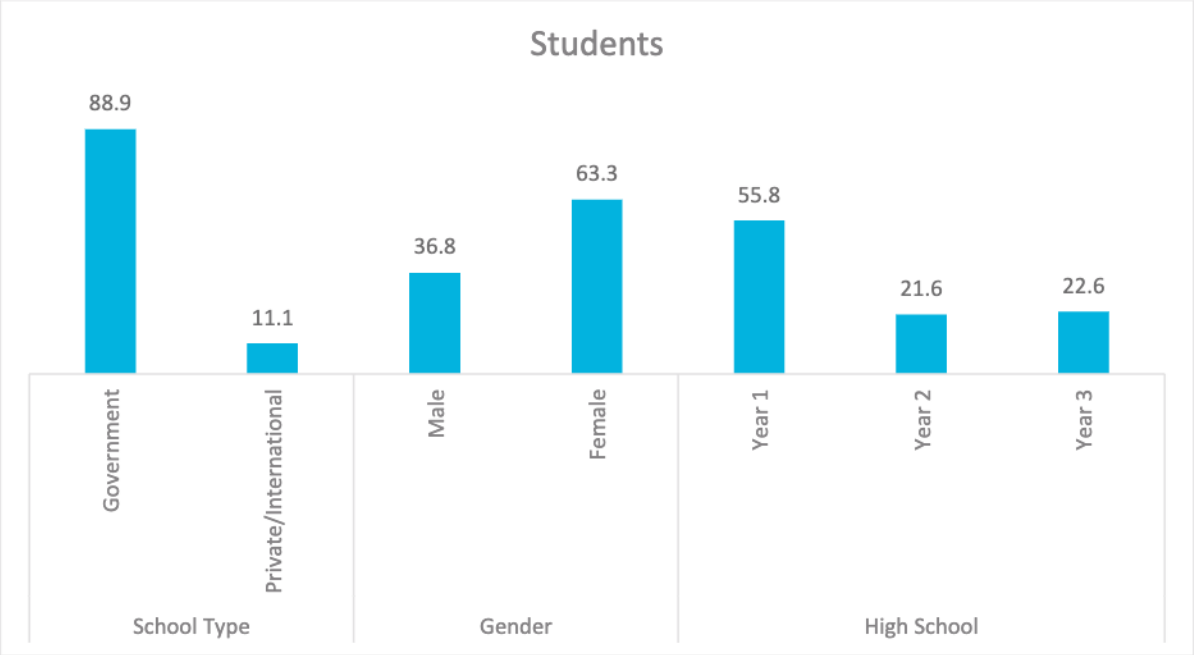
4
Stakeholder groups






Teachers
29.8
24.3
40.11
59.9
89.2
10.8
10 -15
20-25
Male
Female
Government
Private/International
Experience in years
Gender
School Type


Parents
87.6
12.4
49.7
50.3
18.3
29.6
9.8
36
6.33
51.4
48.6
64.1
21.4
21.4
11.2
Government
Private/International
Male
Female
Secondary School
High School
post-high school diploma
Bachelor's degree
Master's degree
Male
Female
Kidergarten
Elementary School
Secondary School
High School
School Type
Gender
Education Level
Children Gender
Children Grade Levels



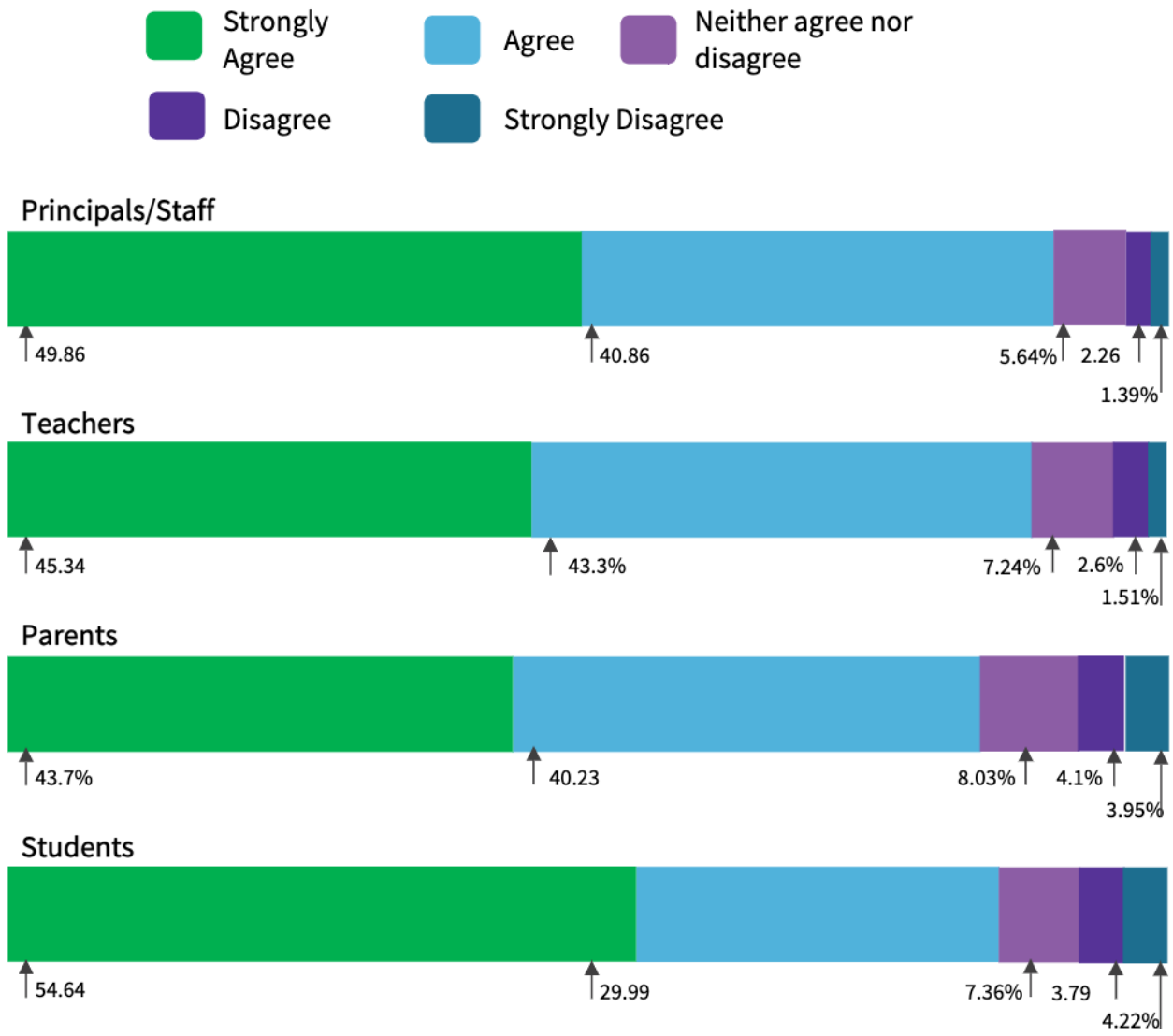
As part of survey development, several dimensions for each stakeholder group were identified as valuable for gathering more in-depth and nuanced information, and survey questions were created for open-ended response. Qualitative interview participants included 30 administrators, 30 teachers, and 9 parents. NELC staff translated open-ended responses for OLC staff. This qualitative feedback was coded using case classifications to identify participant characteristics and gather baseline data. In-text coding was completed by dimension and sub dimension to provide detailed information about participants' attitudes, opinions, beliefs, and experiences with interview questions.

Quantitative and qualitative results were analyzed to develop recommendations aligned to the NELC Online Learning Quality Framework and organized by dimension and sub dimension, and to identify target audience(s), readiness, needs, initiatives, goals, actions, critical success factors, and key performance indicators. As is the hope of any research effort, strong synergy between feedback and data collected on the qualitative and quantitative analysis was detected making this alignment fairly direct and actionable.

Findings

This K-12 Phase II Developmental Study analyzed responses from four different stakeholder groups (principals/staff, teachers, parents, and students) in response to surveys specific to each respondent.

Key themes from their perspectives are reported below and aligned to the areas of the NELC Online Learning Evaluation Framework. Preceding the disaggregated analysis, however, must be the chief and principal finding that satisfaction with online learning in the context of the global pandemic was extremely high across all stakeholder groups.

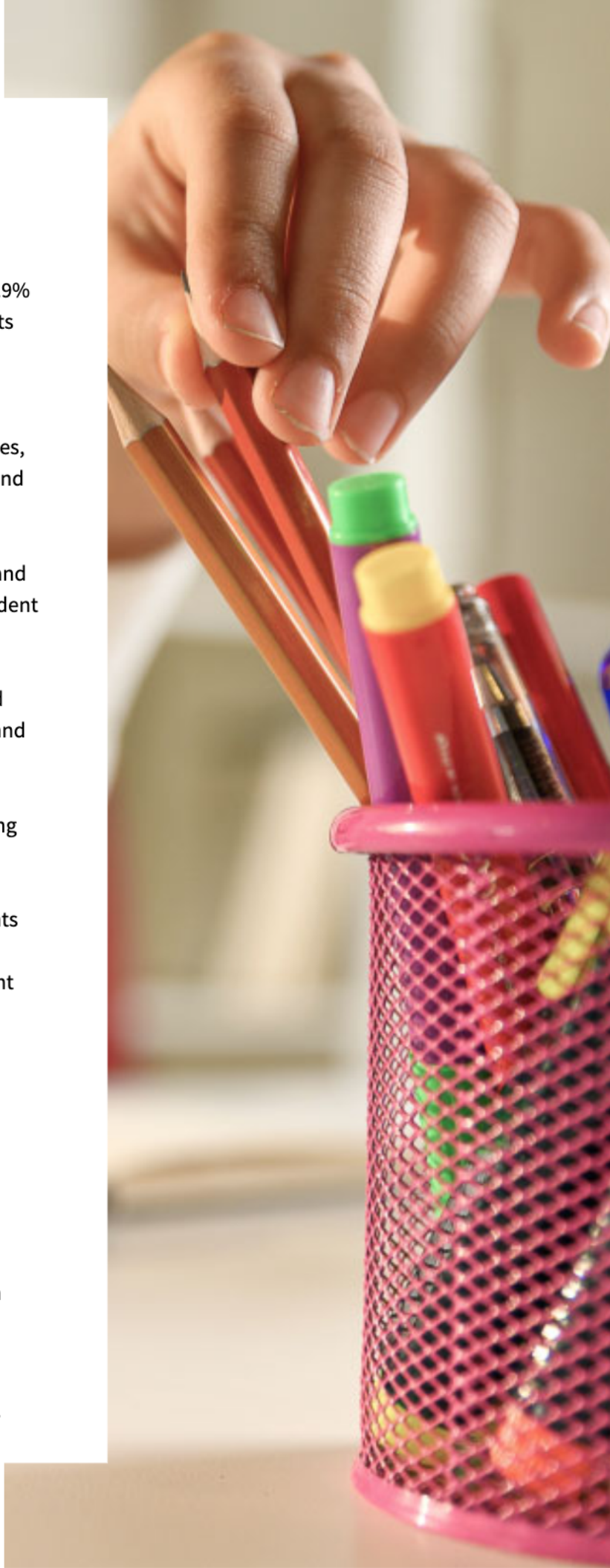


The majority of students, parents, teachers, and principals reported satisfaction with their school's online education when asked about their overall satisfaction. When asked about their general satisfaction, students and parents were primarily satisfied with their students' learning experience (83.9% parents and 84.6% students). The majority of students report that the were satisfied or very satisfied when reporting on their perceptions of educational technologies used in classes (87.2%), technology support and resources, learning support and resources, training and orientation to online learning, content and materials in the classes, assessments, feedback, and grading, online teaching, online learning, communication and interactions between students and teachers, collaborations and interactions among student peers, school communication with students.

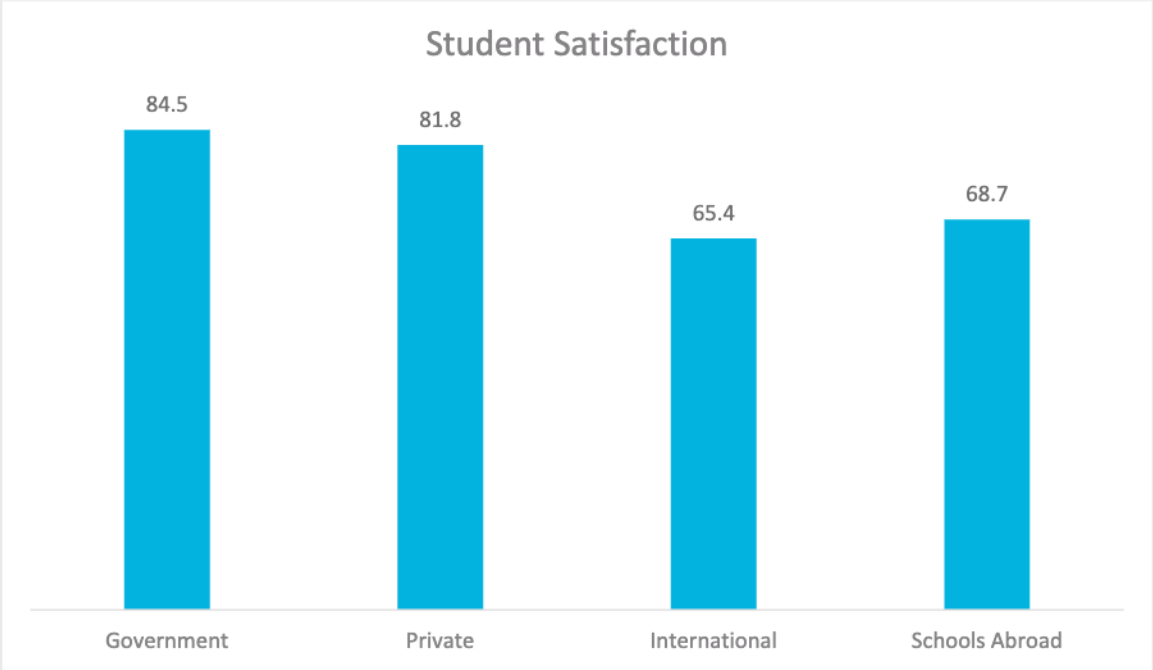
Parents were also satisfied with learning support and resources, as well as communication from teachers and schools, though satisfaction with teacher communication with parents was lower than other areas. Further, parents were satisfied with the learning experience their children received, including communication interactions between students and teachers, assessments, feedback, and grading. Parents were also satisfied with the design, navigation, and organization of the classes, as well as with the content and materials in the classes.

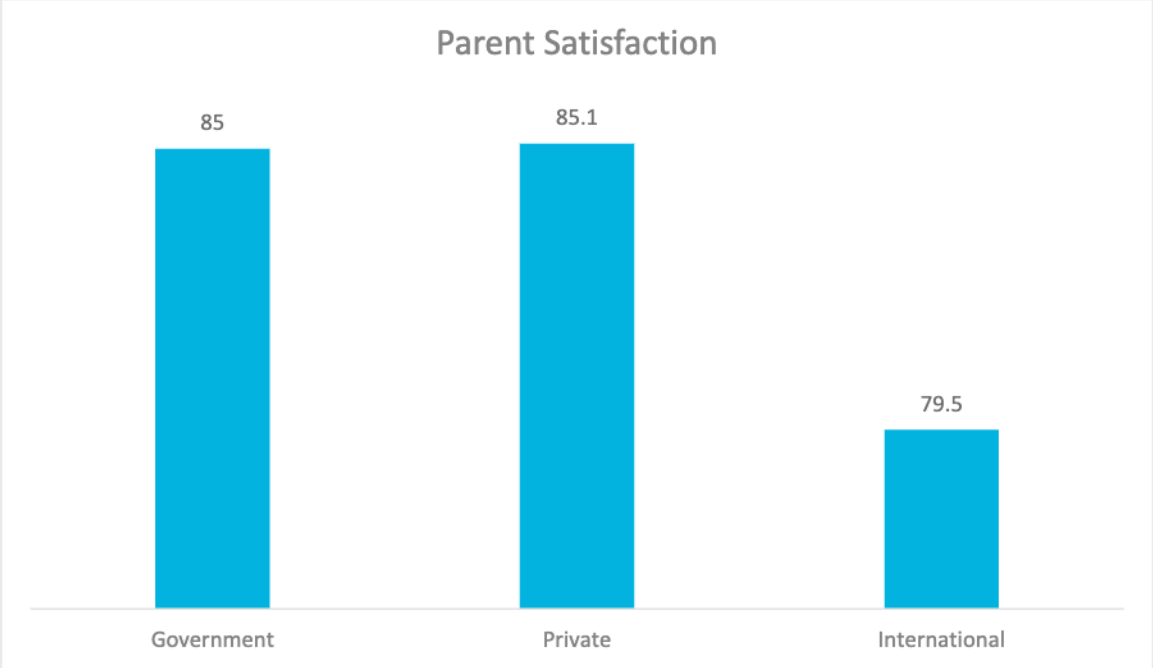
Both students and parents were satisfied with the accessibility of the courses. While a very small percentage of accommodations were reported as needed, survey results from principals and teachers show that it may be an area for future investment.

When prompted with a series of statements to gauge their level of agreement about their experiences with online learning, the majority of students reported satisfaction in teaching and learning online. These findings were particularly strong with respect to the technologies available to them, provided support for



using technology and learning, instructional effectiveness and quality of their online classes, and learning effectiveness in online classes. Survey items related to instructional effectiveness in quality pedagogy and online instruction included active learning, assessment and feedback, clarity of instruction and learning, and interaction with content and course materials.





Benchmarked across school types, students largely reported satisfaction with online learning. Notably within the student groups, both Governmental (84.5%) and Private school (81.8%) school students reported satisfaction above 80%, while International (65.4%) and abroad (68.7%) school students reported lower satisfaction. Nevertheless, these results demonstrate a strong majority of students across the groups reported satisfaction with online learning. Parent benchmarking across school types yielded similar results to the student satisfaction rates. Parents of Governmental school (85.0%) and Private school (85.1%) were nearly proportionately identical, while Private school parent satisfaction (79.5%) was just slightly lower.

Overall, I am satisfied with my school's online education.

Related to benchmarking within stakeholder groups, survey respondents showed very similar satisfaction rates regardless of school types. Teacher respondents all showed very high satisfaction rates across school types, with Governmental (88.1%), International (91.7%) and Private (89.7%) school teachers all reporting near or above 90% satisfaction with online learning. Of the five Royal Commission for Jubail and Yanbu teachers surveyed, 100% reported satisfaction with online learning.

Internal benchmarking across administrator respondents' school groups also showed extremely high rates of satisfaction with online learning. At Governmental schools, satisfaction was 91.5%, while International school administrators reported 91.0% satisfaction. Private school administrators reported 89.6% satisfaction, rounding out the three largest stakeholder groups. Of the four abroad school administrators, 100% of them reported satisfaction with online learning.

Across school types for all four stakeholder groups, International schools were the only category to show much disparity between roles, as they showed the largest variation between school employees and students and/or their parents. In this way, teacher and administrators reported satisfaction above 90% on both occasions, while student satisfaction was 65.4% and parent satisfaction was 79.5%. Across other school types, the satisfaction data was relatively similar.

Students and parents also felt strongly about students' active involvement in classes and the amount of work they completed. They reported strong agreement in statements regarding the quality of the student experience online and the learning opportunities presented to them by their teachers.

Dimension Summary by Stakeholder

Agree and Strongly Agree Responses

My classes were run more efficiently by my teachers after moving to an online learning environment during COVID-19.

85.13% Students

87.06% Parents

I was able to successfully complete all of the work of my classes after moving online.

87.26% Students

79.79% Parents

I felt I learned as much in my online classes as I would have if my class had been offered face-to-face.

66.82% Students

62.02% Parents

Leadership

Dimension Summary by Stakeholder

Agree and Strongly Agree Responses

The school's response to the pandemic supports quality online education and academic continuity.

Administrators 94.3%

Teachers 91.0%

I would recommend that my school strategically expand online learning opportunities in the future.

Administrators 83.8%

Teachers 82.9%

As governance, strategies, policies, processes, and resource allocations are essential for creating conditions that frame a school or institution's online experience, the leadership dimension's results were clearly derivative of online satisfaction at-large. Principals/staff and teachers were similar in their agreement that moving to an online learning environment during COVID-19 improved the institutional culture around digital learning (93.9% agreement among principals/staff; 93.1% agreement among staff). Administrators overwhelmingly found that schools provided policies and procedures to ensure quality online education (89.1%) and that teachers were more efficient operationally after moving to an online learning environment during COVID-19 (93.4%). Further, more than principals surveyed overwhelmingly reported satisfaction with the operations taking place at their school (93.8%).

Among the most promising areas of growth and satisfaction regarding online learning from administrator perspective concerned the COVID-19 pandemic and the remote shift's impact on digital literacy (use of digital tools, ability to work in digital environments) with over 93.9% of principals/staff identifying improvement in students' skills and 95.7% of principals/staff seeing improvement in teachers' skills.

Broadly, teacher perspectives on leadership were overwhelmingly positive. From the results of the survey, more than 91% of teachers reported that their school's response to the pandemic supported quality online education, and more than 90% reported their school's response supported academic continuity. Further, more than 94% of teachers were satisfied with the communication from leadership. Additionally, a majority of teachers reported that school leadership provides policies and procedures to ensure quality online education (87.4%)

> The pandemic forced us to use a new method of leadership. In fact, it proved to all of us our capabilities in planning, and abilities to overcome all the challenges. The distribution of roles was really important, too, to overcome all the obstacles and problems in order to succeed and achieve our goals.
>
> – Abullah Alharbi, School Leader

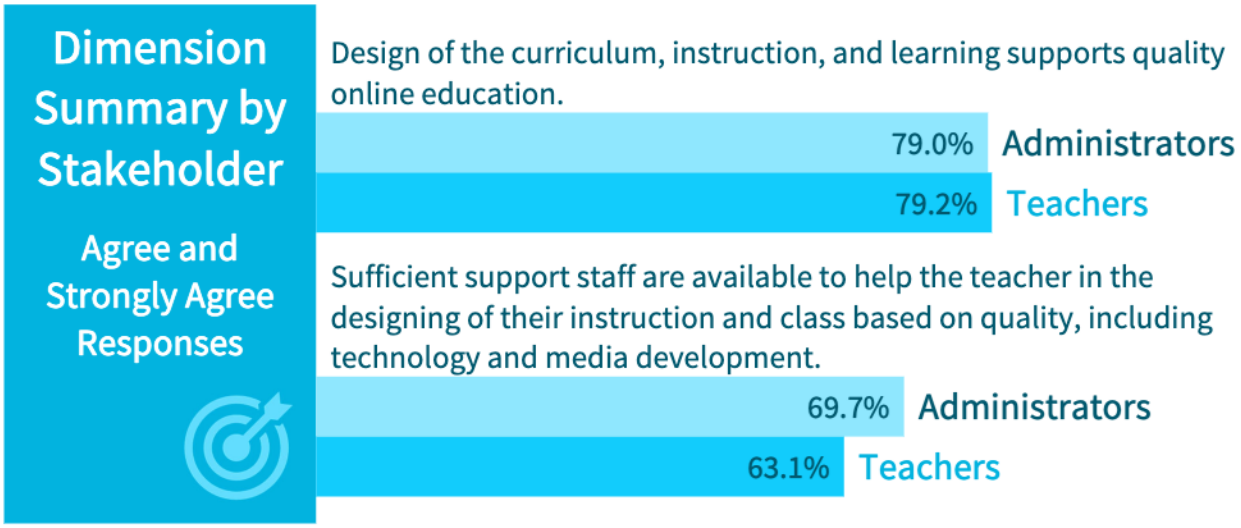
While student data did not specifically focus on school leadership, students did report strong support for their school strategically expanding online learning in the future (84%). Implicitly, combined with the overall satisfaction reporting, this finding speaks to the impact of leadership across students' experiences.

From parents' perspectives, the survey data indicated that leadership supported quality learning experiences and academic continuity during the pandemic. To that end, the vast majority of parents reported that school leadership supported quality online education and academic continuity (84.1%). Furthermore, parents reported strong satisfaction with the communication they received from their child's school (87.6%). These measures indicated that leadership did create conditions for quality learning and continuity throughout the pandemic, and that they communicated effectively with parents through a rapidly changing context.

Curriculum Design & Planning

Related to curriculum design and planning, survey data indicates that administrators believed the transition to online learning creates quality experiences for learners. Further, results also indicate that teachers had robust technology and media development support from staff in designing their instruction and classes. From teachers' perspective, results related to curriculum design and planning were largely similar, with a large majority of teachers finding satisfaction with both the design of the curriculum and

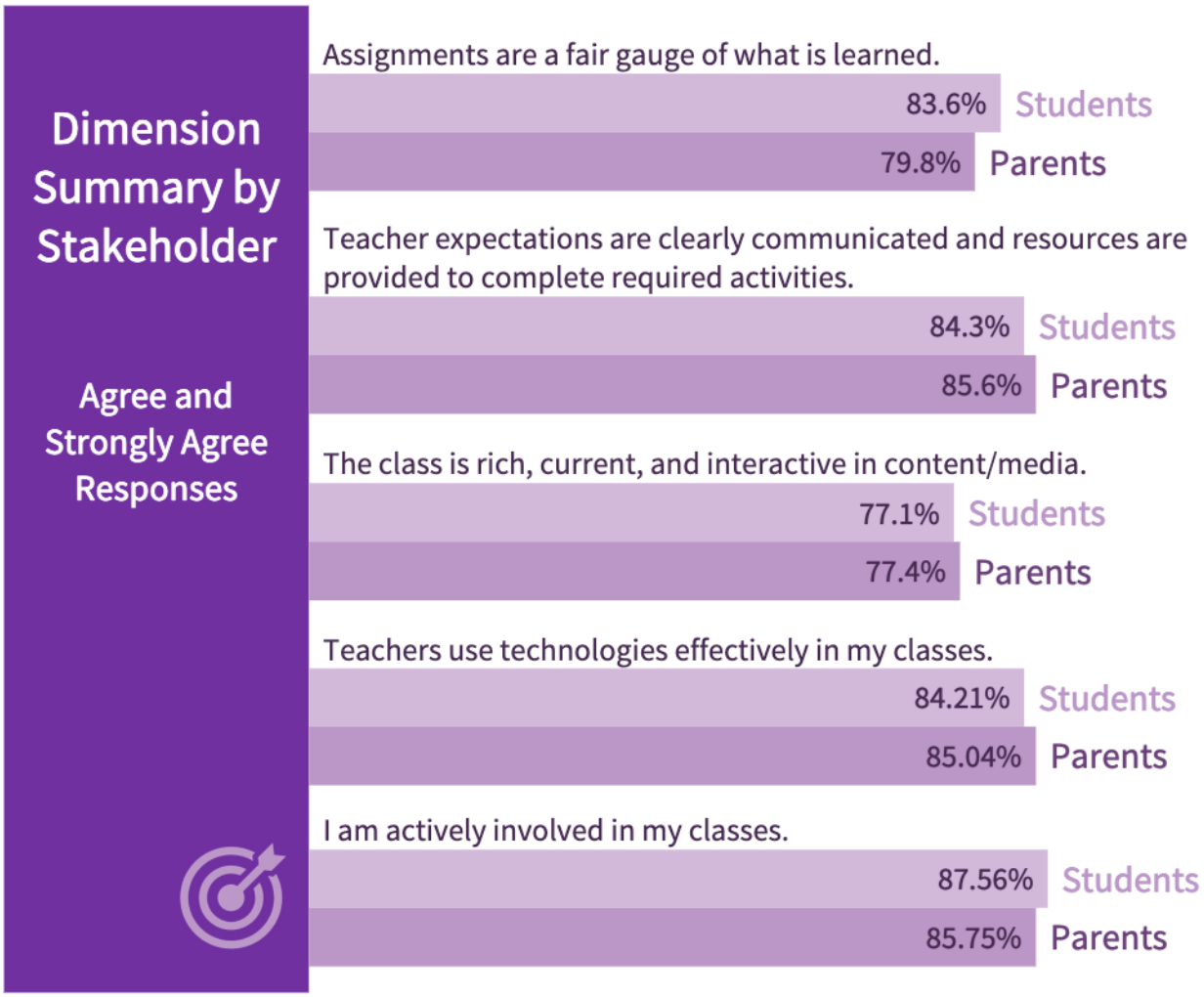
the support staff availability for the development of instruction. The table below displays results of this dimension for both groups.



Further related to curriculum and design, a significant finding from the data showed that more than 94% of teachers reported providing students with rich, current, and interactive content and media (94.1%), and nearly nine-in-ten teachers reported satisfaction with the quality of the content and materials for their classes (89.1%). For administrators, satisfaction with the quality of content and materials was similarly high (87.2%).

Student data revealed strong satisfaction from students related to the curriculum design and planning. Across the survey items, students reported agreement or strong agreement that assignments were a fair gauge of what was learned, that teacher expectations were communicated clearly, that learning experiences featured rich content and media, that teachers used technology effectively, and that the students themselves were actively involved in their classes.

From parents' perspectives, the survey data strongly indicated that the curriculum design and planning led to high quality online learning experiences for their students. As displayed in the table below, more than three-quarters of parents reported satisfaction across each survey item related to curriculum design and planning. Results largely tracked with student results across this dimension, and indicate that the transition to online learning during the pandemic led to quality learning experiences.



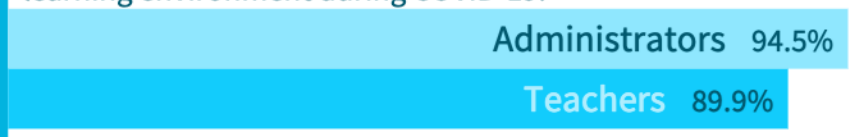
Online Teaching and Learning

In addition to curriculum design and planning, the instructional delivery of online teaching and learning is an essential component of NELC's Online Learning Evaluation Framework. At times online providers experience an implementation gap between what the instructional design intended and what is delivered to students, thus revealing opportunities for continuous improvement. This Phase II survey sought to more deeply interrogate the extent to which implementation gaps may have existed, and moreover how the implementation of online teaching led to increased success across areas including classroom/teacher communication, learner engagement, teacher expectation setting, course outcomes, learner interaction and feedback, and instructional innovation.

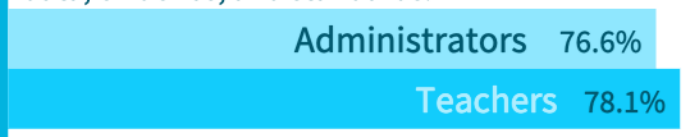
Dimension Summary by Stakeholder

Agree and Strongly Agree Responses

Teachers were more efficient operationally after moving to an online learning environment during COVID-19.



Curriculum, class, and instruction are designed and updated based on data, evidence, and standards.



Administrators reported being very satisfied with online teaching and learning amidst the rapid ramp up to extensive digital learning during the COVID-19 pandemic. Students and parents were most satisfied with the student experience in the classes. Students and parents affirmed this, reporting a strong sense that students are actively involved, frequently interact, and complete their work. Teachers, 74.5% of whom agreed that they were chiefly involved in the design of curriculum, class, and instruction also agreed and reported that students are overall engaged in their online classes and interact frequently with teachers and other students.

Teacher perspectives are particularly germane to this category of online learning quality given the brunt of day-to-day responsibilities that fall on their position in the area of instructional delivery. From the data, a total of 92.3% of teachers reported effectively using technology in their classrooms, while 95.2% of teachers said they communicated frequently and in a timely manner with students. Further, 82.3% reported that active learning was used in their classrooms as a tool to maximize student engagement.

> Online learning made me more creative and capable. The first thing I had to do was to understand the student's strongest points and weakest points. I studied the learner's needs in order to best support them.
> --Noha Alrefaiy, Teacher

Teachers also overwhelmingly felt that students were engaged in their classrooms and interacted frequently with them and other students (89.8%). This result may connect to responses showing that teachers believed they managed students' expectations with clear communication about the details of the class through an online class site and related helpful course materials (95.9%). Thus, related to managing expectations, teachers' responses aligned with parents and students. Results indicated that teachers were managing students' expectations, clearly communicating the details of the class through an online class site, providing helpful materials, including rich and current content and media, communicating frequently and timely with students, and providing frequent feedback through assessments to improve student learning.

> The pandemic did not stop us. On the contrary, we took advantage of the time and took everything into our own hands regarding online learning. Students took the exams and attended the classes as if nothing changed.
>
> --Misahall Al-Otaibi, Teacher

Dimension Summary by Stakeholder

Agree and Strongly Agree Responses

The teacher sends or posts messages frequently and responds in a timely fashion.

The learner is connected in classes and interacts frequently with other students.

In addition to the findings above, survey data revealed that parents expressed strong agreement regarding their children's learning and interaction within their classes. They reported that their child is connected in their classes, interacts frequently with other children, and is actively involved in their classes. They also reported the teacher's expectations were clearly communicated to their child on the class site, resources were provided to help them complete the activities as required, teachers used technologies effectively, and the teacher sent messages frequently and responds to my child in a timely fashion.

> The Ministry of Education succeeded with online learning, and it succeeded on monitoring, managing, and supporting online learning. This led to positively impacting learning process for students. In this way, I believe online learning was great.
> – Waleed Al Shuayb, Parent

Overall, the majority of students were satisfied with online teaching and online learning. From this analysis, few implementation gaps between the design and the delivery were found through the data. From the study, four high-level findings emerged, related specifically to online teaching and learning.

Engagement on Track

Students reported that they are engaged in their courses. They are actively involved in their classes. The assessments are active and provide them feedback on their learning. They report that they complete assessments frequently and receive feedback so that they can improve their learning as well as feel that their assignments are a fair gauge of what they have learned.

Clear Expectations Communicated

Students reported that they understand what is expected of them and have the resources they need to succeed. The teacher's expectations were clearly communicated to them on the class site, and resources were provided to help them complete the activities as required.

Student and Teachers Socially Involved

Students were socially involved with their teachers and their peers. Students reported that the teachers posted messages frequently and responded in a timely fashion. They reported social presence as well as feeling connected in their classes and interacting frequently with other students.

Course Materials Calibrated

Students reported that the content and course materials were effective. They agreed that they had rich, current, and interactive content and media in their classes.

The alignment of perspectives across this category is salient to note. Students reported satisfaction with their schools' and teachers' abilities to ensure learning and instructional effectiveness through content, assessments, and interaction. Moreover, students were satisfied with content and materials in the classes, assessments, feedback, and grading, communication and interactions between students and teachers, collaborations and interactions among student peers, and school communication with students. Wholly, this suggests students and teachers were putting in great effort to learn and teach online, and all stakeholders were satisfied with the progress in the last year.

Assessment

Related to assessment, satisfaction data from all stakeholder groups was notably high. Principals and staff found strong satisfaction with the assessment of student learning (81.6%), while teacher satisfaction with assessment was even higher (86.3%). From students' perspective, assessments, feedback and grading were highly satisfactory (88.0%), while parents' sense of satisfaction was also markedly strong (86.3). Across stakeholder groups, assessment was strong. One prominent finding from the study, related to the ways in which teachers provided assessments and communicated with students to improve learning. Of the more than 34,160 teacher respondents, more than 95% reported providing low-stakes assessments and feedback to students in order to improve their learning (95.1%). Further, a similar percentage of teachers reported frequent and timely communication with students (95.2%), as managing students' expectations and clearly communicating the details of the class to students (95.8%). What these results suggest is that teachers were incredibly dedicated to serving students and providing quality online learning experiences.

> Online learning increased students' digital skills and they benefitted from the platform with anytime learning… All of my students have achieved their best during the last term and hopefully they will continue at the same level.
>
> *– Monsour Akdhair, Teacher*

Dimension Summary by Teachers

Agree and Strongly Agree Responses

I provide students low-stakes assessments and feedback so that they can improve their learning.

Teachers 95.1%

I communicate frequently and timely with my students.

Teachers 95.2%

I manage students' expectations and clearly communicate the details of the class through an online class site and other helpful class materials.

Teachers 95.8%

From students' and parents' perspectives, assessments were a similarly satisfactory component of the online learning experience, related to teachers' and administrators' perspectives. As shown in the table below, both students and parents reported high levels of satisfaction with both the frequency and feedback for learning. Similarly, both groups reported high levels of satisfaction with the assessments, feedback, and grading overall.

Dimension Summary by Stakeholder

Agree and Strongly Agree Responses

Assessments are completed frequently and receive feedback to improve learning.

Students 82.1%

Parents 80.9%

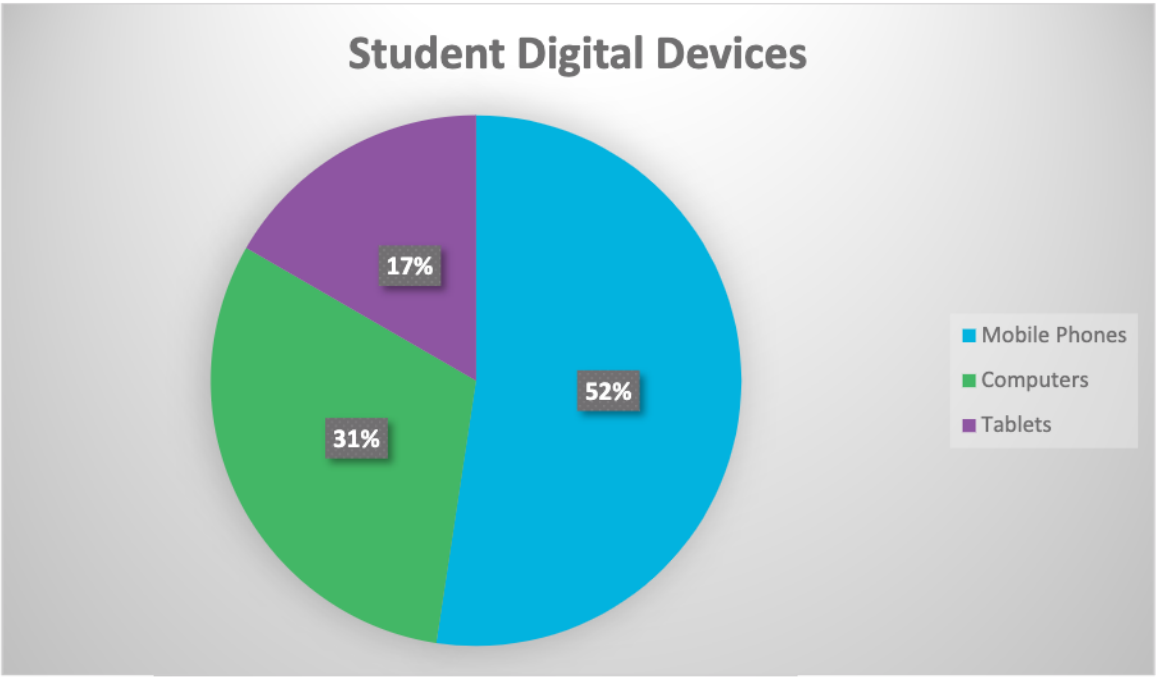
Satisfaction with assessments, feedback, and grading.

Students 88.0%

Parents 86.3%

Technology

Students and parents were generally satisfied and in agreement with the school's ability to provide educational technology, technology support and resources, and learning support and resources, including training and orientation to online learning.



It is important that students not only have technology resources needed for online learning, but that they have support for using technology and academic support online. Students reported that there were educational technologies available to help them learn online, that teachers used the technologies effectively, and that they were provided information on technology and learning support resources. Teachers were in agreement that they are using technology effectively as well. More specifically, students reported having access to appropriate support personnel to address student technical and class-related questions, problem reporting, and complaints. They were provided orientations to their online classes, the class design, and the technologies used in the class. The large majority of students felt that they had technical and academic support when they needed it. Regarding the technology, students and parents were satisfied with their students' learning management system and IEN TV experiences.

Parents did report future recommendations for investments in broadband internet for their students (67%.7%), as well as for future online readiness orientations for themselves and their students (36.5%). In addition, a selection of parents reported hoping for online skills training and support for themselves (30.9%) as well as for their students (34.7%). Qualitative data also supports this assertion, as parents shared stories with a hope for further orientation and skill development for themselves and their students related to technology. As one parent noted, important steps they had to take included "training and orientation on how to use different applications, especially Microsoft Teams and Google Forms."

Across the surveys, the preponderance of respondents reported using the Madrasati learning management system (LMS) in their schools. More than 90% of students reported using Madrasati (90.6%), with an 85.6% satisfaction rating. A majority of students reported using IEN TV in their learning (57.7%), with the vast majority of students finding it to be satisfactory (79.1%). Parent findings related to Madrasati and IEN TV were similar to the students' results, with a larger majority of parents reporting their children using Madrasati (88.1% usage; 86.0% satisfaction), and a majority using IEN TV (54.5% usage; 80.1% satisfaction). Across the data, both students and parents reported high levels of satisfaction with the resources available to them, which enabled high quality learning experiences.

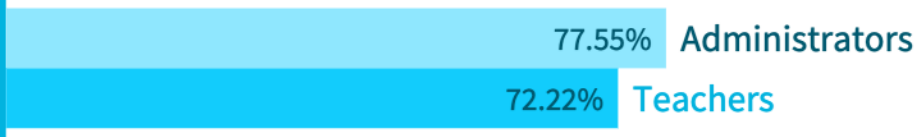
> With technology, the learning process becomes better and easier. The students were independent when studying and answering their assignments, and their cognitive and technological skills grew.
> – Ibrahim Haddadi, Parent

Student data revealed a high level of satisfaction with the educational technologies used in their classes (88.8%), as well as with the technology and support resources available to them (79.7%). Further, students reported strong agreement with the notion that teachers used technology effectively in their classes (84.2%). Related to this, parents reported strong satisfaction with the educational technologies available to help their children learn online (83.3%), as well as with the way that teachers used technology (85.0%) in their children's' classes.

Dimension Summary by Stakeholder

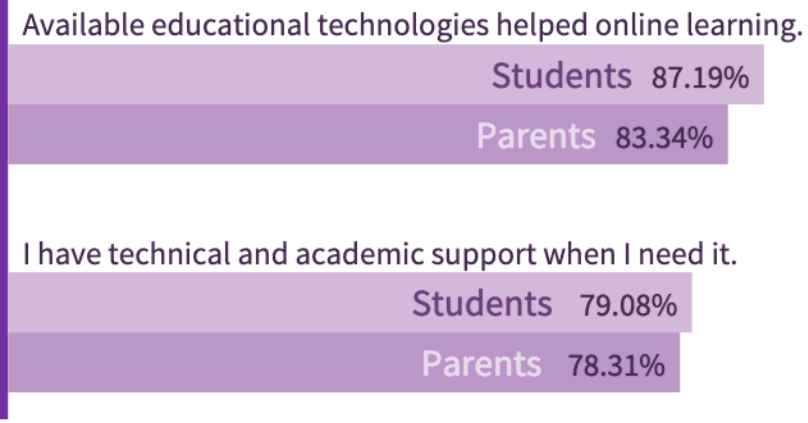
Agree and Strongly Agree Responses

Technical staff are provided to support the learning environment and the technology needs of teachers.



Dimension Summary by Stakeholder

Agree and Strongly Agree Responses



Student Support

Related to student support, findings from the survey revealed high levels of satisfaction and agreement with statements affirming student support throughout the online learning transition. While students, parents, teachers, and principals felt the experience was comparable to in-class learning experiences prior to COVID-19, all stakeholder groups believed that moving to an online learning environment improved students' digital literacy and that classes were run more efficiently by the teachers after moving to an online learning environment

> **It is important that students not only have technology resources needed for online learning, but that they have support for using technology and academic support online.**

Based on the data displayed in the table below, majorities of administrators and teachers believed that students had access to the appropriate support personal to address technical and academic questions. As the numbers indicated, administrators reported this at a higher rate, but teachers still agreed to this effect at nearly a two-thirds rate. The most significant finding, however, related to student support, emerged from the reported improvement in students' digital literacy skills thanks to the support provided to them. Both teachers and administrators agreed with statements to this effect at rates above 93%.

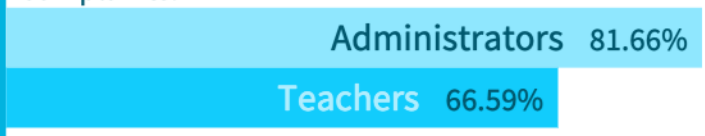
Moving to an online learning environment during COVID-19 improved the students' digital literacies skills (i.e., use of digital tools, work in digital learning environments)

- Teachers & Administrators (Over 93% Agreement)

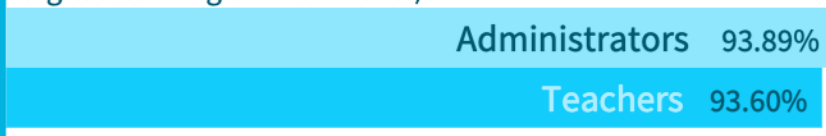
Dimension Summary by Stakeholder

Agree and Strongly Agree Responses

Students have access to appropriate support personnel to address student technical and academic questions, problem reporting, and complaints.



Moving to an online learning environment during COVID-19 improved the students' digital literacies skills (i.e., use of digital tools, work in digital learning environments)

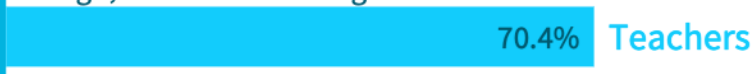


Continuing related to student support, teachers reported that students were supported through the provision or orientations, information and resources for academic and technology support. Administrators reported high rates of agreement with the statement that students have technical and academic support when needed. These results are shown in the table below.

Dimension Summary by Stakeholder

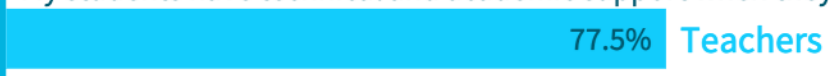
Agree and Strongly Agree Responses

Students are provided orientations to their online classes, the class design, and the technologies used in the class.

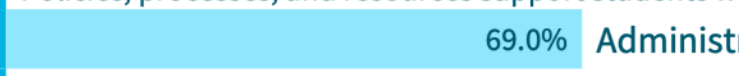


Students are provided information on technology and academic support resources.

My students have technical and academic support when they need it.



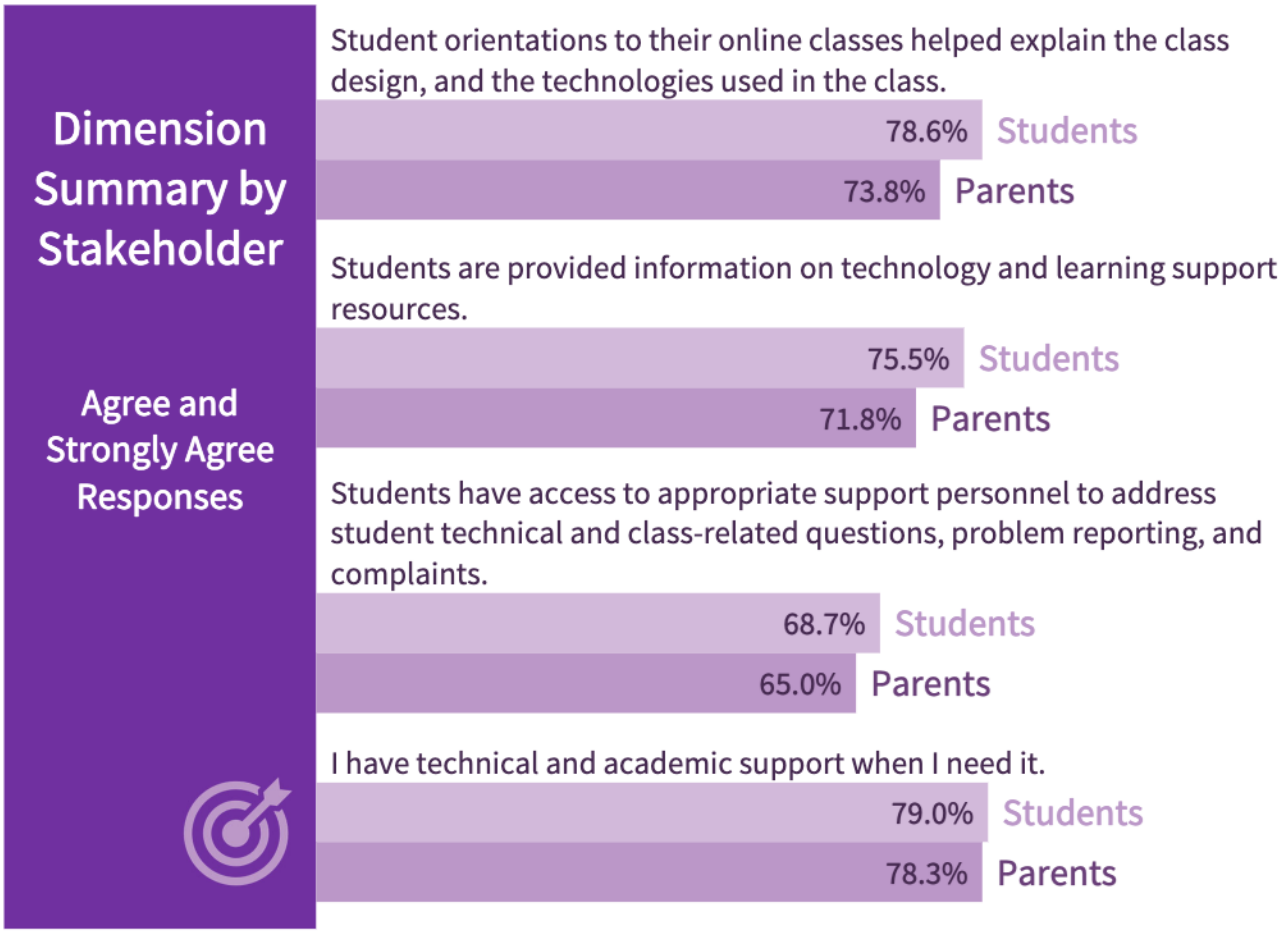
Policies, processes, and resources support students with disabilities.



Students and Parents reported a strong majority of agreement related to access to support personnel to address technical and class-related questions, as well as to technical and academic support when needed.

- Teachers & Administrators (Over 93% Agreement)

Findings for student support from students and parents revealed similar patterns of satisfaction and agreement with respect to the provided support during COVID-19. Both students and parents expressed a sense of being supported through orientations to their online classes, as well as with resources related to technology and learning. Both groups also reported a strong majority of agreement related to access to support personnel to address technical and class-related questions, as well as to technical and academic support when needed. These results are displayed in the table below.



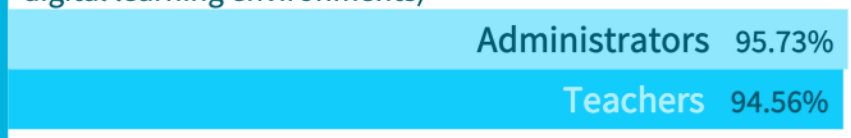
Training Support

Survey findings showed that one silver lining that emerged from the pandemic, insofar as it related to quality online instruction, was that both administrators and teachers overwhelmingly found that moving to an online learning environment improved teachers' digital literacies skills (95.7% for administrators; 94.5% for teachers). Further, more than 93% of both groups also found that moving to an online environment improved the institutional culture related to digital learning (93.4% for administrators; 93.0% for teachers). What these findings suggest is that while the pandemic has been devastating and costly in many ways, educators in the Kingdom of Saudi Arabia did persevere and innovate through the difficult challenges COVID-19 presented.

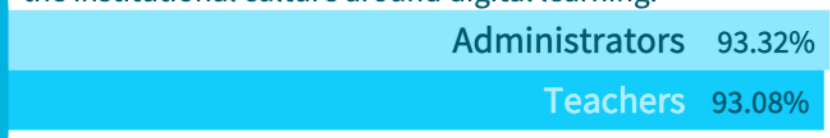
Dimension Summary by Stakeholder

Agree and Strongly Agree Responses

Moving to an online learning environment during COVID-19 improved the teachers' digital literacies skills (i.e., use of digital tools, work in digital learning environments)



Moving to an online learning environment during COVID-19 improved the institutional culture around digital learning.



With such a large ramp-up in online learning happening in such an expedient way, technology supports were a critical necessity. Based on the survey data, more than three-quarters of teachers responded with agreement that they had access to support for educational technologies when needed (75.1%). Nearly two-thirds of teachers also reported having support related to instructional design and media (64.9%). Beyond training and support, teachers also reported a sense of satisfaction with the level of security for online learning (83.2%).

Dimension Summary by Stakeholder

Agree and Strongly Agree Responses

Moving to an online learning environment during COVID-19 improved my digital literacies skills (i.e., use of digital tools, work in digital learning environments)

Students are provided information on technology and learning support resources.

Students have access to appropriate support personnel to address student technical and class-related questions, problem reporting, and complaints.

Evaluation & Continuous Improvement

Dimension Summary by Stakeholder

Agree and Strongly Agree Responses

If given the opportunity, I look forward to offering fully-online instruction at my school again.

80.8% Administrators

83.5% Teachers

Online classes have comparable outcomes to onsite classes.

52.7% Administrators

53.9% Teachers

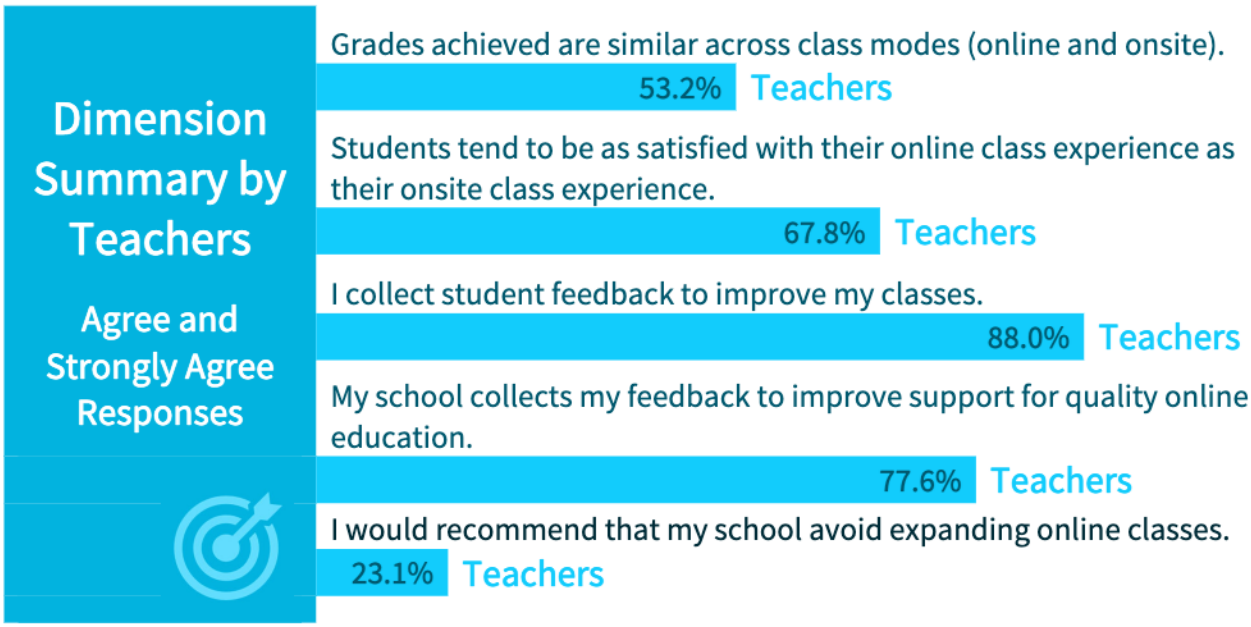
Learning that takes place online is comparable to learning that takes place in the onsite class.

52.9% Administrators

53.4% Teachers

> "I liked the strong connection between students and the school. Before no such bond existed. Through online learning, I became more aware of the students' satus, and the families are now involved in the learning process and they show appreciation to school and teachers."
> - Faisal Alyazyidy, School Leader

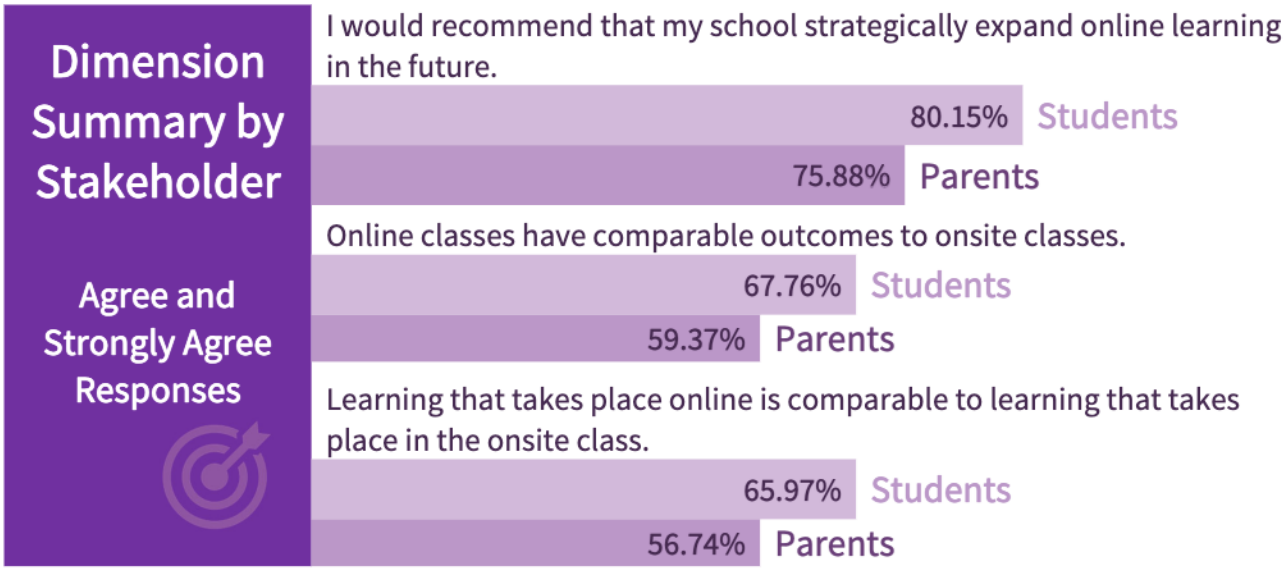
Related to monitoring and engaging in continuous evaluation and reflection for improvement, teachers shared a number of revealing insights - these findings are displayed in the table below. While a slight majority of teachers shared that students' grades were similar across class modes (53.2%), more than two-thirds of teachers responded that students tended to be as satisfied with their online class experience as their onsite class experience. A large majority of teachers reported collecting feedback to improve their classes, either individually or at the school level. Finally, less than a quarter of teachers surveyed reported a recommendation that their school avoid expanding online classes beyond the pandemic. Thus, the results for evaluation and continuous improvement suggest a body of reflective practitioners who saw collected data and reported satisfied students are generally not opposed to the expansion of online learning.



The findings from students and parents, related to evaluation and improvement of online learning, also demonstrate favorable findings for the students' experiences. As the table below shows, more than two-thirds of students reported that online classes have comparable outcomes to onsite classes (67.6%), while just under 60% of parents did. Similarly, a majority of both parents and students found that online learning was comparable to onsite learning.

More than two-thirds of students reported that online classes have comparable outcomes to onsite (67.6%), while just under 60% of parents did.

Perhaps most importantly, more than 80% of students (80.1%) and more than three-quarters of parents (75.8%) supported recommending their school strategically expand online learning in the future.



Recommendations

To ensure quality in online education, the statistical findings and expert review of the survey have informed a series of propositions to guide decisions and resources for future strategic planning.

1. *Ensure students have access to a laptop, Internet, and a supportive study environment.*
2. *Provide strategies for skill building for students and parents in time management, organization, and technology work productivity applications through an online learning readiness intervention.*
3. *Implement professional development for online teaching with teacher incentives to improve use of time and engagement of students.*

Recommendation 1: Technology Access

While it is 2021, the pandemic has reminded the world that there is still a digital divide that became more obvious when entire countries transitioned online to emergency remote instruction. The top challenges for students, parents, teachers, and administrators are unquestionably Internet costs and technology (hardware and software) costs.

Students' and parents' top suggestions for future investment is in student broadband Internet and student laptops. Principals and teachers also noted access to a good work environment, skills in using technology, and technical support services with needed investments in student broadband Internet, student laptops, and technological infrastructure (e.g., core learning technologies). While it is 2021, the pandemic has reminded the world that there is still a digital divide that became more obvious when entire countries transitioned online to emergency remote instruction. The top challenges for students, parents, teachers, and administrators are unquestionably Internet costs and technology (hardware and software) costs.

Although there were high levels of satisfaction for all factors, the lowest area for students was technology support and resources. Teachers and parents, although above average levels of agreement, also report slightly lower levels for technical support. Several parents also noted through the qualitative data a need for further orientation and trainings, both for themselves and their students. This was particularly true for the specific technology platforms and applications that students needed to submit and complete assessments.

Principals also reported lower levels of agreement with statements regarding availability of technical staff to support the learning environment and the technology needs of teachers. While principals felt that there are adequate policies and procedures to support online learning, developing new policies and providing resources to ensure technology access, including laptops and Internet access, as well as appropriate support are critical to future strategic planning to ensure quality.

Recommendation 2: Time Management and Online Learning Readiness

The flexibility of online education alters the pacing of learning and requires new thinking around the use of time, synchronous or real time and asynchronous or over time. While often online learning may replicate onsite or face-to-face learning with extensive online live or synchronous meetings, this can be a challenge for students working at a distance and parents supporting them in the home. The top challenges for students and parents include time management and length of time spent online. Principals report time spent online as a top challenge as well. Top endorsements from students and parents include an investment in supporting student time management and organization skill development.

Students' ability to manage time is a well-noted needed skill for success in online learning and should be built into student online orientations and online readiness interventions. While there was strong satisfaction with all factors, parents rate satisfaction with the orientation to online learning lower. Parents, teachers, and principals recommended investments in orientations to online learning. Incorporation of time management strategies could improve the perception of the effectiveness and satisfaction with orientations to online learning. Also, professional development for teachers in designing with the flexibility of time and using live, synchronous, wisely in their teaching and incorporating asynchronous activities or activities that can be done outside of a live class meeting independently or in groups is critical. This will be discussed in the next recommendation.

In addition to improvement of orientations to online, the findings suggest a need for an online learning readiness intervention to help children and parents in skill development to learn online. Parents, teachers, and principals recommended investments in student and parent online readiness and student online work skills training and support (e.g., Microsoft Word, Google Docs). Opportunities for parents and students to learn about effective practices in time management, organization, technology applications, and other skills needed to learn effectively online can increase satisfaction in the online education experience and learning effectiveness. Moreover, parents and children can learn about learning online and metacognition in an online learning readiness intervention.

Disseminating effective practices in learning online through online readiness intervention, training, and assessment can help improve confidence in students and parents in learning online and supporting their child's learning online. Distinctly, an online learning readiness intervention can address issues with technology access, technology skills development (using applications, communicating via technology), and learning skills development (organization, time management, communication, and others). These interventions will improve students' digital literacy skills.

Recommendation 3: Online Teaching Professional Development

Teachers report that a top area investment should be made in teacher professional development training and teacher incentives. Teacher professional development for online and incentives is proven to improve learning and instructional effectiveness. As described in the previous recommendation, while there is the potential to improve the learning experience by including opportunities for parents and students to learn more about learning online to ready themselves for future experiences, there is also the potential to improve teaching and instructional effectiveness through online teaching professional development. Principals report that curriculum, class, and instruction are designed and updated based on data, evidence, and standards. These findings provide an opportunity for such improvement.

- ✓ *Invest in Teacher professional Development*
- ✓ *Provide Online Teacher Professional Development Opportunities*
- ✓ *Improve orientation for online learning and technical support.*

There is an opportunity for online teaching professional development for teachers to learn how to use time more wisely in courses with a variety of synchronous and asynchronous teaching strategies. As online offers flexibility, there is *less* of a need to replicate the live and real-time environment of a traditional onsite class and *more opportunities* when activities are developed over time at a students' own pace individually or with their peers.

Although teachers agree that there was sufficient training and orientation for online learning and technical support, it was rated lower than other areas. Administrators align in that their levels of satisfaction are lower for teacher support, support staff for supporting design, technology, and media development, and training and orientation to online learning than other areas although still generally satisfied. Therefore, providing teachers with additional orientation and training for online teaching could better prepare them and increase their satisfaction with their online teaching experience.

> Teacher professional development for online and incentives is proven to improve learning and instructional effectiveness.

In addition to time management, student collaboration and engagement could be improved. Teachers report that although they are generally satisfied with engagement, it is lower than other areas. Teachers also report collaborations among students lower, while students are looking for investment in more interactive activities, such as games and simulations, that are more engaging than traditional onsite teaching approaches moved online. Often in schools, when learning is moved online the student fun and excitement of interacting with their peers is lost. Through professional development teachers can work with experts and each other to design and integrate more of these opportunities into courses.

Finally, parents may be seeking additional communication from teachers. Sometimes parents are supporting students, tutoring them, and helping them manage their responsibilities, yet are unclear themselves as to what is expected, deadlines, and requirements. Although onsite teaching usually focuses on the students, professional development can help teachers establish mechanisms in their courses to include parents in the communication planning and distribution so that everyone can work together to enhance student learning online.

Recommendation 4: Update Policy, Regulations, and Standards

In support of the accomplishments made and response to an unprecedented global pandemic rapidly expanding the use of distance learning modalities, a final recommendation with respect to establishing a post-pandemic normal-state and global reality is to review the policy, regulatory, and quality standards framework used at present as this has been undoubtedly influenced by the proliferation of digital learning across the Kingdom in the past year and a half. Such a review will allow the Kingdom to pilot and integrate emerging technologies, pedagogies, and methods for assessment that will see it continue to lead on the international playing field of online learning.

The KSA prides itself on a comprehensive and robust policy and regulatory framework to support and ensure learner competitiveness, educational quality, and focused student success outcomes. The accomplishments of the framework have included quality administration and staff, strategic planning and continuous improvement cycles, and marked investments in technology systems and access which aim to minimize and eliminate a digital divide across the nation. As the Kingdom of Saudi Arabia continues to emerge from the COVID-19 pandemic and transition toward more innovative, resilient, and continuously improving systems of education, the policies and standards guiding and shaping quality online learning will need refinement and enhancement based on these essential lessons learned. Dimensions and standards for online quality have surfaced in importance and in awareness in ways that would have taken years to rise to the top had the volume and scale of digital learning not have taken place since 2020.

To ensure the continued success and development of online learning across primary and secondary education across the country, updates to the policies and standards that shape online learning should be reviewed and, if necessary, updated, and the regular or periodic basis for continued updates be refined relative to the level and amount of online and distance learning adopted in the post-pandemic world. Such regular reviews and updates will ensure a quality focus going forward for students and their families, as well as for the teacher and administrator stakeholders at present registering support for online quality.

“Such reviews will allow the Kingdom to pilot and integrate emerging technologies, pedagogies, and methods for assessment that will see it continue to lead on the international playing field of online learning.”

Learning Management System (LMS) Study Framework and Context

About the Madrasati Learning Platform

The Madrasati learning management system is an interactive platform launched by KSA's Ministry of Education in August 2020 and is supervised by the General Department of E-learning and Distance Education. While a previous iteration of the platform has been in use since 2014, the COVID-19 pandemic accelerated the Ministry of Education's implementation of Madrasati at a national scale. The platform is accessible for the KSA's education stakeholders through individual accounts for students, teachers, school leaders, and educational supervisors, including all of the country's public and private schools.

Madrasati provides robust delivery of e-learning, similar to many options more often seen by a large virtual or online school provider at a district or organization.

Madrasati Usage Across KSA and Early Success

Madrasati is a fully integrated LMS that supports both synchronous and asynchronous e-learning options for learners in KSA. For students who use the platform, Madrasati offers a portal to their school schedules and courses, including learning materials and content like live and recorded lectures and slide presentations, assessments, activities, tools for student-to-teacher and student-to-student communication, a dashboard and reporting on their progress, and a calendar. Madrasati integrates Microsoft Teams to support synchronous virtual class sessions with teachers as well.

The rollout of the Madrasati platform has been nothing short of remarkable across the country, launching at the beginning of the 2020 fall semester in late August. Since its launch, the swift adoption by stakeholders across the country, most notably from learners and teachers, suggests a robust success. By the end of October 2020, the eighth week of the semester, nearly 5 million public and private school students had accessed the platform, amassing some 229 million visits. By the end of November 2020, the Madrasati platform had seen a reported 6 million students – approximately 99% of the total K-12 population – access the platform and had amassed 292 million visits. This includes 63 million synchronous virtual classroom sessions delivered, with more than 1.2M class sessions conducted daily. More than 13 million assignments and quizzes completed (Saudi Ministry of Education, 2020).

Madrasati User Response Data

In the fall of 2020, the Online Learning Consortium published stakeholder and user feedback on Madrasati. In a widely distributed, national survey that included more than 189,000 respondents—including students, parents, teachers, principals and supervisors—the overwhelming majority of stakeholders reported satisfaction with the platform.

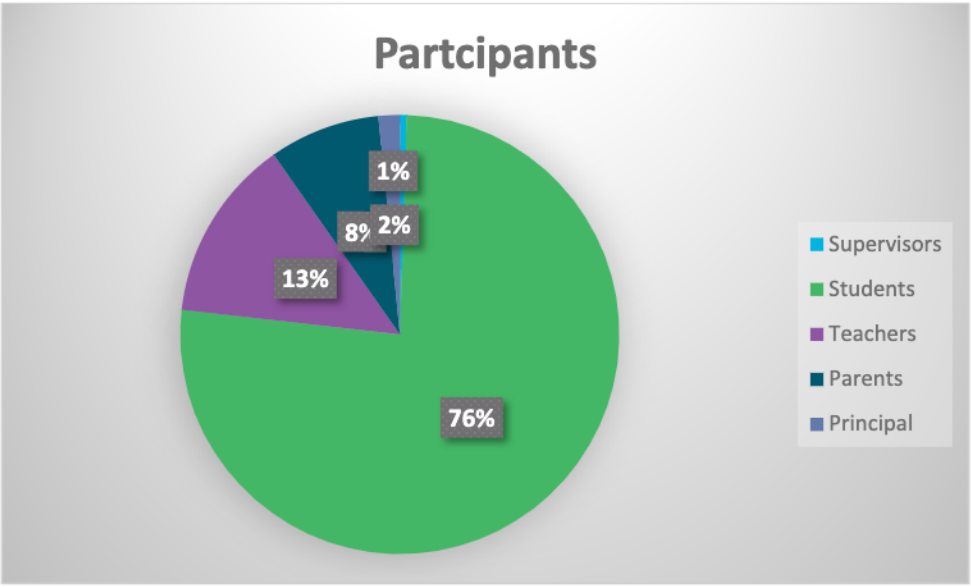
	Teachers	Principals	Supervisors	Students	Parents
Overall Satisfaction	90.6%	93.9%	88.2%	86.3%	87.0%

Source: *Online Learning Consortium. (2020). The State of Online Learning in the Kingdom of Saudi Arabia.*

Below, specific survey* items are displayed for each stakeholder and user group.

+ 196K
Number of completed surveys

+ 4
Stakeholder groups



Student satisfaction

- 85.0% reported ease with logging in to the virtual classes through Microsoft Teams
- 82.1% reported ease in interact with their teachers
- 79.3% reported ease in accessing their schedule and class preparations
- 78.8% reported ease in interacting with their peers
- 78.7% reported ease in accessing and completing exams

- 76.4% reported ease in completing the required assignments
- 75.2% reported ease in accessing the required assignments
- 72.7% reported ease in receiving feedback on my performance from their teachers

* 196,649 participated in the LMS Study sponsored by the Digital Transformation Unit of the Saudi Arabia Ministry of Education.

Teacher satisfaction

- 94.9% reported ease in attending virtual classes and delivering lessons
- 94.1% reported ease in accessing the school schedule and creating a virtual classroom
- 89.5% reported ease in interacting with their students
- 86.3% reported ease in recording students' attendance
- 84.6% reported ease in attending virtual meetings with the school staff
- 83.2% reported ease in adding extra curriculum, assignments and lessons
- 81.0% reported ease in building and scoring exams
- 75.8% reported ease in viewing students' answers to assignments
- 73.3% reported ease in giving students the chance to view their performance on assignments
- 72.2% reported ease in assessing students' performance on assignments

Parent satisfaction

- 76.3% reported ease in communicating with their children's teachers
- 74.6% reported ease in communicating with the school staff regarding their children
- 72% reported ease in following their children's achievement reports

Principal satisfaction

- 85.4% reported ease in verifying data matching for students, teachers and classes
- 80.9% reported ease in setting the school schedule
- 79.1% reported ease in following up with the teachers and school staff to accomplish their tasks
- 78.1% reported ease in assigning different roles and tasks to the school's staff
- 76.2% reported ease in holding virtual meetings and communicate with the school staff
- 66.8% reported ease in posting school announcements
- 66.4% reported ease in accessing school reports to make the right decisions

Supervisor satisfaction

- 84.2% reported ease in attending teachers' virtual classes
- 83.0% reported ease in supervising teachers
- 79.5% reported ease in evaluating teachers' performance
- 74.0% reported ease in holding virtual meetings with teachers
- 65.8% reported ease in providing feedback to teachers

This response data shows that across user groups' individual items, nearly all had an efficacy and ease response ("very easy" or "easy") above 70%. Based on these results, the early indications are that the Madrasati platform has been a unique success for stakeholders at all levels of the education system.

Students and teachers both responded with a sense of efficacy and ease for engaging in the learning and teaching process, as well as completing assignments. Principals reported confidence and ease in using the platform to manage the operations of schools. Parents reported a sense of ease in supporting their students and communicating with the school, and supervisors shared that they could effectively support, observe, and evaluate teachers.

The International LMS Landscape for K-12 Education

Global LMS Implementation: An overview

A learning management system (LMS) is an online platform that enables the delivery and transaction of communications, learning materials, resources, tools, and assignments between educators and students, in both physical and digital classroom environments. Notably, the LMS allows teachers to offer tailored instruction that can be accessed by students anytime, anywhere without geographic constraints. At its best, LMS implementation can create a simpler and more efficient teaching and learning experience for students, teachers, administrators, and even parents. An effective LMS also offers features that improve student outcomes and supports the scaling of a viable and guaranteed curriculum for all students, while promoting teacher efficacy. Essentially, the LMS enables a “one stop shop” for multiple stakeholders throughout an education system to access and contribute to a learner’s success.

Broadly, but not wholly, decisions to adopt LMS in K-12 education have been often made at a local level rather than at a state or national level. Historically, education ministries and governments across the international community tended to formally adopt LMS less frequently at the national levels, often as a measure of cost savings and practical implementation. One tendency within this history has been to use options like localized servers and platforms, rather than widely distributed, cloud-based strategies.

At the national level, learning resources in many countries have been based more on a distribution model. In this model, ministries and departments of education may create and/or curate a website(s) with resource content, learning materials and digital educational resources, rather than support a formal, interactive LMS. These resources often include rich content, lesson plans, and assessments, as well as links to other broadly distributed platforms or content providers. During the pandemic, many governments have also been able to secure licenses to commercial or institutional content. This model is often more feasible at a national government level than trying to establish the detailed logistics

necessary to develop and implement an internally-developed learning management system, which might require intensive coding and development, as well as planning for interoperability with complementary student information systems and other data support systems. Adopting commercially developed LMS platforms is *easier*, as most come with out-of-the box support to align with other information systems but requires a greater level of established infrastructure and support capability than hosted or shared curriculum and resources via the distribution model.

One reason for this is likely related to the amount of financial and organizational capital and maintenance required to host, operate, and maintain such systems. For example, consider the challenge of managing individual student and user accounts, which are a key function of many LMSs. The challenges of accessing such systems are both financial and technical, rendering most solutions beyond text-based communication at low cost a challenge in many locations. Ultimately, for those that can adopt a formal internally developed or purchased LMS solution, the commercial cloud-based approach (rather than local institutions hosting) is a more viable approach, for the aforementioned reasons.

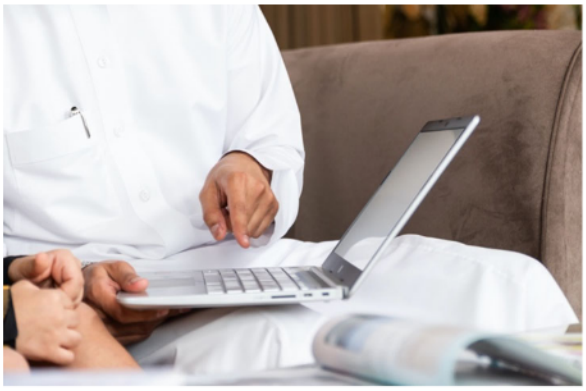
Adoption during COVID

Due to the emergent COVID-19 pandemic throughout 2020, many nations have rapidly adopted e-learning solutions and platforms as a rapid response to wide school closures and the emergence of remote and/or at-home learning for millions of students across the globe. Early March saw more than 1.2 billion students across the globe transition to remote or at-home learning (Li & Lalani, 2020). This disruption has accelerated institutional and organizational adoption of LMSs, as well as prompted educational authorities to reconsider how they provide the groundwork or necessary environment or prerequisites for e-learning.

Challenges to LMS Implementation During COVID-19

While some nations have been able to effectively contract with commercial LMS providers or develop an LMS internally, many nations – and indeed entire global regions – have not been able to develop nationwide platforms. This is may be due to a lack of infrastructure for and/or access to stable, high-speed internet connectivity, student and teacher access to devices, teacher and school access to digital teaching materials, or quality systems for delivery, assessment, and measurement at a local or regional/national level (Belay, 2020; Huang et al., 2020; World Bank, 2020). These challenges can be particularly exacerbated in rural areas of many countries, where governments and ministries may not have the capacity to support rural educators and learners.

In one case study of a strained national response to COVID, Belay (2020) reviewed Ethiopia's challenges to meet the needs of students suddenly forced out of school in the spring of 2020. Most notably, the broad delivery of e-learning solutions via LMS to K-12 students in Ethiopia was largely infeasible, due to a lack of essential technological infrastructure and delivery capability. For example, ubiquitous access to high-speed internet is not available nationwide, as only 12% of rural areas have access to the Ethiopia's grid electricity (World Bank, 2019). As such, delivery of e-learning through a LMS platform in a country where there are more mobile



phone connections than home internet connections might be considered a secondary or tertiary need for educational support. While Ethiopia responded by providing educational content via radio and television, Belay noted other challenges and disparities, including broad socioeconomic disparities, the lack of quality of school resource support and quality in rural areas, and the ability of teachers and parents to support newly remote learners. While a single snapshot of one nation's challenges, these difficulties are not unique to Ethiopia; rather, they are representative of many national responses where establishing or provided e-learning coursework through an LMS was not feasible. This example shares similar sets of conditions and constraints with the responses in other African nations, including Ghana, Zambia and

In the Eastern Caribbean region, the Organization of Eastern Caribbean States (OECS) reported on the member states' efforts to strategically plan and launch their response to COVID-19, which included transitioning to digital education systems (OECS, 2020). In the report, the OECS noted that while most every country was able to implement some kind of digital learning strategy, all of them experienced challenges with a lack of ubiquitous internet connectivity and device availability for students. Across the region, states were more likely to adopt the organization and distribution of physical materials for parent pickup, or delivery of instruction through mobile-based apps like WhatsApp (OECS, 2020). As of March 2020, the members states of the OECS were working with telecommunications companies and philanthropic organizations to expand affordable internet service and device provision across the region, in order to create the infrastructure for expanded e-learning capabilities.

LMS Implementation in North America

Like much of the rest of the world, North American countries have responded quickly to the COVID-19 pandemic. Those that implemented LMS-specific solutions are highlighted below.

The Response in the US and Canada

In the United States (US) and Canada, the pandemic has accelerated the formal adoption of LMS platforms for K-12 institutions, local education associations (LEAs) and regional and national departments and ministries. As Hill (2020) has reported, an estimated 60% of K-12 LEAs in the US and Canada that enroll more than 2,000 students – a staggering 85% of total enrollment in these countries use at least one LMS. Further, approximately 80% of students are enrolled in a district which has formally adopted an official LMS. Hill also notes that this year has been the first time that many schools and districts have agreed to use a LEA-wide LMS solution.

In the US, in particular, several state-level departments and boards have entered into formal agreements with LMS providers since the beginning of the pandemic. Most states have language in their 2020 contingency planning for COVID-19 that strongly recommends that districts and schools in their state adopt an LMS, if they haven't already. For example, in Massachusetts, guidance from July 2020 (and updated in October 2020) by the Massachusetts Department of Elementary and Secondary Education (MDESE) noted that all districts were "strongly encouraged" to implement a LMS solution, and that Google Classroom, Canvas, and Schoology are three of the learning management system platforms most widely used in the state (MDESE, 2020).

Figure 1: Yearly New Implementation of the LMS in K-12 Institutions (North America)

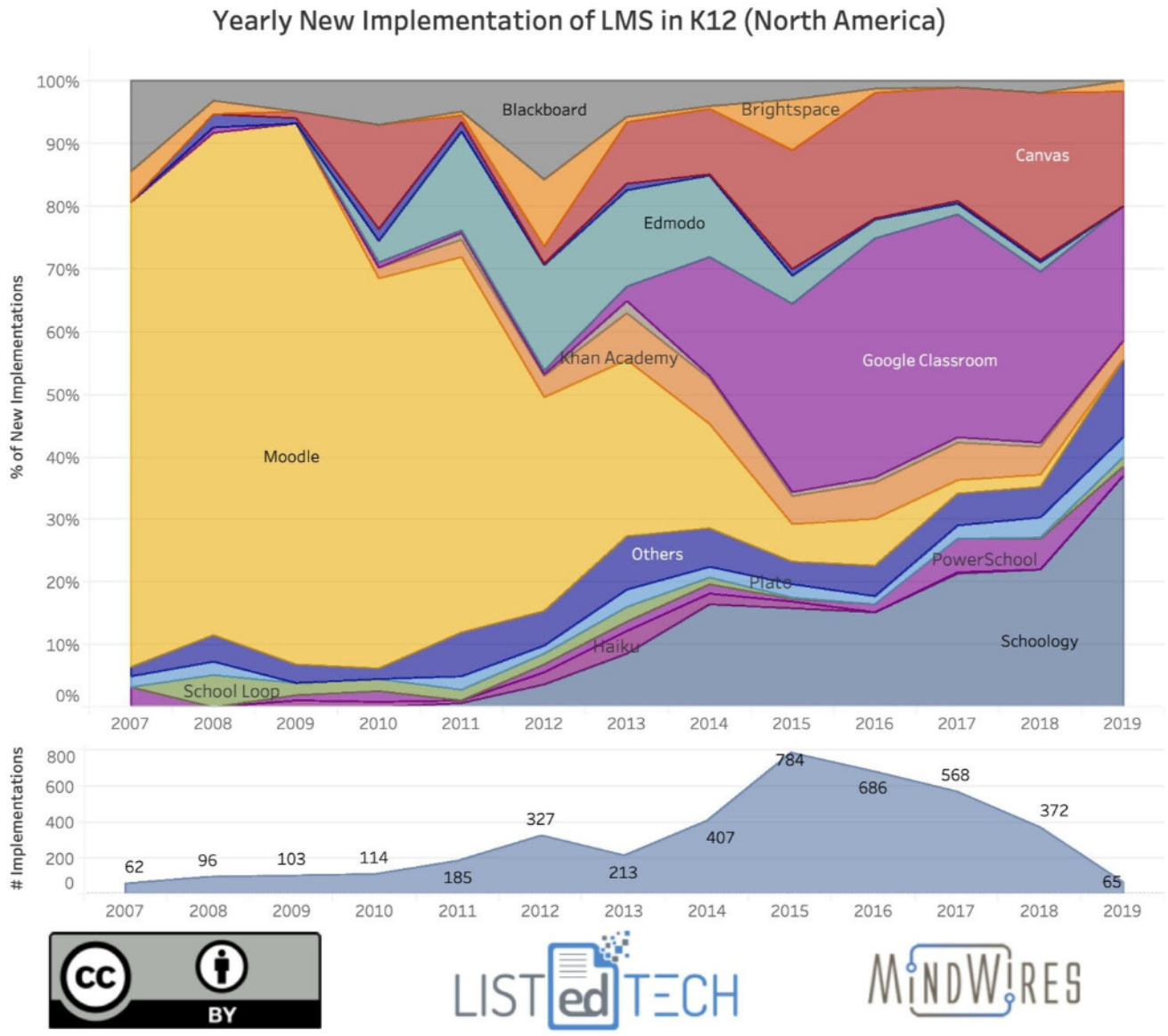


Figure 2: Number of US & Canadian Districts Adopting a New LMS as of End of September 2020

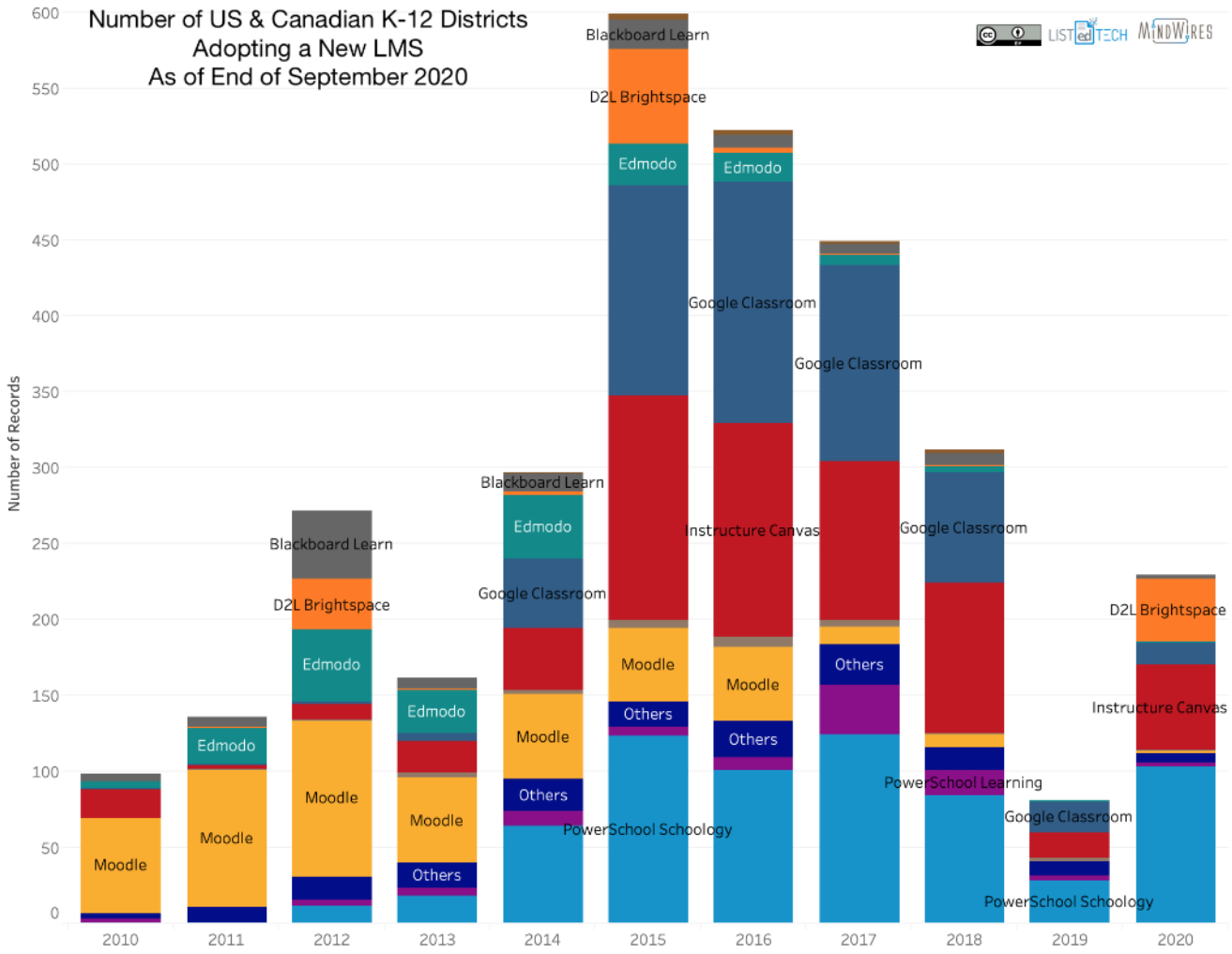
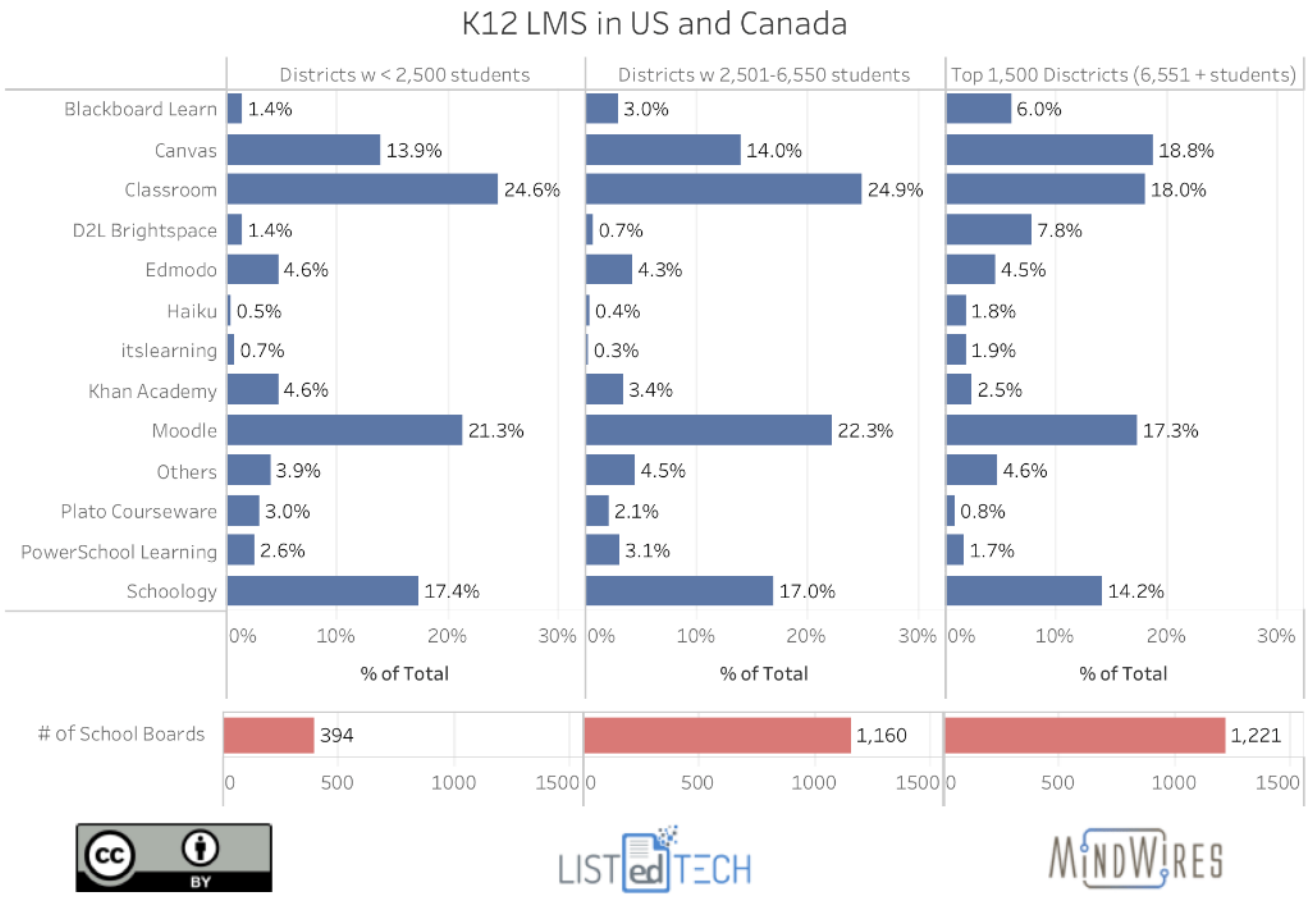


Figure 3: K-12 LMS Usage in US and Canada



US states with formally adopted LMS or master contracts for LEA purchasing

US State	LMS or Master Contract partner	Number of local educational agencies (LEAs)	Number of schools	Number of students
Alabama	Schoology	139	1,463	747,042
Alaska	Canvas	54	507	132,104
Arizona	Blackboard Learn	738	2,449	1,269,584
Delaware	Schoology	45	226	136,027
Hawaii	Blackboard Learn	1	292	179,698
Iowa	Canvas	333	1,331	510,932
Maryland	Blackboard Learn	25	1,445	879,601
Nebraska	Canvas	244	1,004	323,391
New Jersey	Maestro LMS	678	2,516	1,369,715
New Mexico	D2L	128	853	338,112
North Carolina	Canvas	115	2,705	1,490,472
Pennsylvania	Odysseyware / Edgenuity	782	2,971	1,719,336
Ohio	Internally developed	1,653	3,853	1,983,469
Oregon	Canvas	197	1,239	576,407
South Carolina	Canvas	102	1,268	804,158
Texas	Schoology	1,203	8,771	5,343,893
Utah	Canvas	163	1,113	652, 348
Vermont	Canvas	60	308	84,387
West Virginia	Blackboard Learn	57	762	282,879
Wyoming	Canvas	48	359	93,261

Sources: Walbank, 2020; Lieberman, 2020; Texas Education Agency, 2020; State Educational Technology Directors Association (SETDA), 2020.

Elsewhere in North America

Beyond the US and Canada, a variety of responses have emerged, mostly in line with a distribution model, with one notable exception. In response to the pandemic, Jamaica has announced a plan to develop an internally developed LMS for national implementation. The Ministry of Education, Youth and Information announced plans in July 2020 to establish a national LMS, in partnership with undisclosed providers.

Across much of the rest of North America, the distribution model has been adopted, largely due to constraints of infrastructure and lack of access for learners. For example, Mexico has launched their Aprende en Casa *("Learning at Home")* platform, which primarily consists of audiovisual broadcasts and recordings distributed via television and curated through a distribution model on the Aprende en Casa website. Like many countries around the world, the infrastructure challenge of limited access to internet and connected devices limits the extent to which learners in Mexico can leverage an LMS platform for more robust e-learning.

In El Salvador and the Dominican Republic, ministries of education have set up websites that provide access to content and lessons for students. A recent World Bank (n.d.) report has noted that in El Salvador, "a call center, staffed by five people, accompanied by six subject-area specialists, responds to related questions around the clock." Both countries are also leveraging social messaging applications like WhatsApp to deliver content.

Finally, several countries across the Caribbean, including Belize and Barbados, have leveraged the resources and platforms of the Caribbean Examinations Council (CXC), which historically has supported postsecondary entrance testing. During COVID-19, however, the CXC has established a learning platform that includes learning content and virtual classroom capability.

LMS Implementation in Asia

LMS implementation across Asia. South Korea was one of the first countries affected by COVID-19, reporting its first case in January 2020. The Korean Education and Research Information Service (KERIS) reported in April 2020 that K-12 education across the country moved online in response to the pandemic (KERIS, 2020). As Cha and So (2020) noted, the Ministry of Education in South Korea offered three primary ways for students to engage in online learning during the shift to online learning: real-time interaction, contents-based online class, and assignments-based online class. The primary LMS vehicle used for the contents-based online class was the e-Hakseupto platform, where students could access lessons and content (KERIS, 2020). Educators throughout South Korea also continued to leverage the communication tools and platforms of other commercial providers, including Google Classroom and Canvas.

China hosts the world's largest K-12 student population on the planet numbering over 176 million learners. This makes the Chinese education system the largest state-run education system in the world

(Gulati, 2020). China, the epicenter of the COVID-19 outbreak, issued school closures between late January and early February 2020. In response, China launched a national cloud learning platform for junior and senior high school students, and started broadcasting primary school classes (Jee, 2020). *EdSurge* reported that two of China's nationally supported platforms, Empower Learning and Educloud, which had existed prior to the COVID-19 pandemic, were augmented with the support of Chinese tech companies to provide service during remote learning in the early part of 2020 (Ning & Corcoran, 2020). In addition to these platforms, students in China also used a variety of apps and platforms, including the WeChat app, Alibaba's Future School, and Tencent Meeting. These technologies supported synchronous and asynchronous learning, in addition to the LMS platforms.

In India, the Ministry of Human Resources Development established a number of platforms solutions for distance learning across the nation. The DIKSHA and SWAYAM platforms provided online courses and content, while the e-PATHSHALA and other digital content repositories provided access to learning materials for students across the country (Indian Commission for Cooperation with UNESCO, n.d). In addition to these platforms, radio and television broadcasts supplemented remote learning opportunities.

In many other Asian nations, the challenge of lacking nationwide internet access, and the subsequent lack of pre-existing distance learning platform implementation meant that many countries were pushed to respond to COVID-19 by beginning their gap analyses and strategic planning to launch. For example, Bangladesh, Pakistan, and Philippines are all countries that reported an identified need to further understand their gaps and opportunities to better establish distance learning platforms (Bangladesh Ministry of Education, Ministry of Primary and Mass Education, 2020; Ministry of Federal Education and Professional Training, Government of Pakistan, 2020). While most nations analyzed were able to provide emergency, remote distance learning support to students through television and radio broadcasts, the pandemic more often exacerbated the needs for robust online learning platforms than it did reveal nations' strategic readiness.

Comparison of Madrasati to Top LMS Providers in K-12 Contexts

Profile Benchmarking: Madrasati with Commercial LMS Providers

After a review of the LMS landscape in global K-12 education, it is worth comparing the KSA's effort to launch Madrasati across public and private K-12 schools during the global pandemic. That is because in just a few short months, KSA has launched an internally developed solution, capable of integrating with the Microsoft 365 cloud platform and Microsoft Teams, to create a learning platform that is comparable with the fee-based commercial services that many other national, regional, and local education authorities are leveraging. While most countries around the world have been forced to adapt to the rapid disruption of COVID-19, it is worth noting that Madrasati's functionality compares with the options provided by commercially adopted systems.

LMS	Estimated number of users*	Year of initial launch / release	Cloud-based	Development type
Canvas (Instructure)	~30 Million worldwide	2011	Yes	Commercial provider
Edmodo (NetDragon)	~88 Million worldwide	2008	Yes	Commercial provider
Google Classroom (Google)	~100+ Million worldwide	2014	Yes	Commercial provider: free integration w/ Google Suite enterprise ($)
Schoology (PowerSchool)	~20 Million worldwide	2009	Yes	Commercial provider
Moodle	~249 Million worldwide	1999	Yes	Commercial provider
Blackboard Classroom (Blackboard)	~20 Million worldwide	2014	Yes	Commercial provider
BrightSpace (D2L)	~15 Million	2011	Yes	Commercial provider
Madrasati	**~6 million in KSA**	**2020**	**Yes**	**Internally developed: Freely available to all public and private schools**

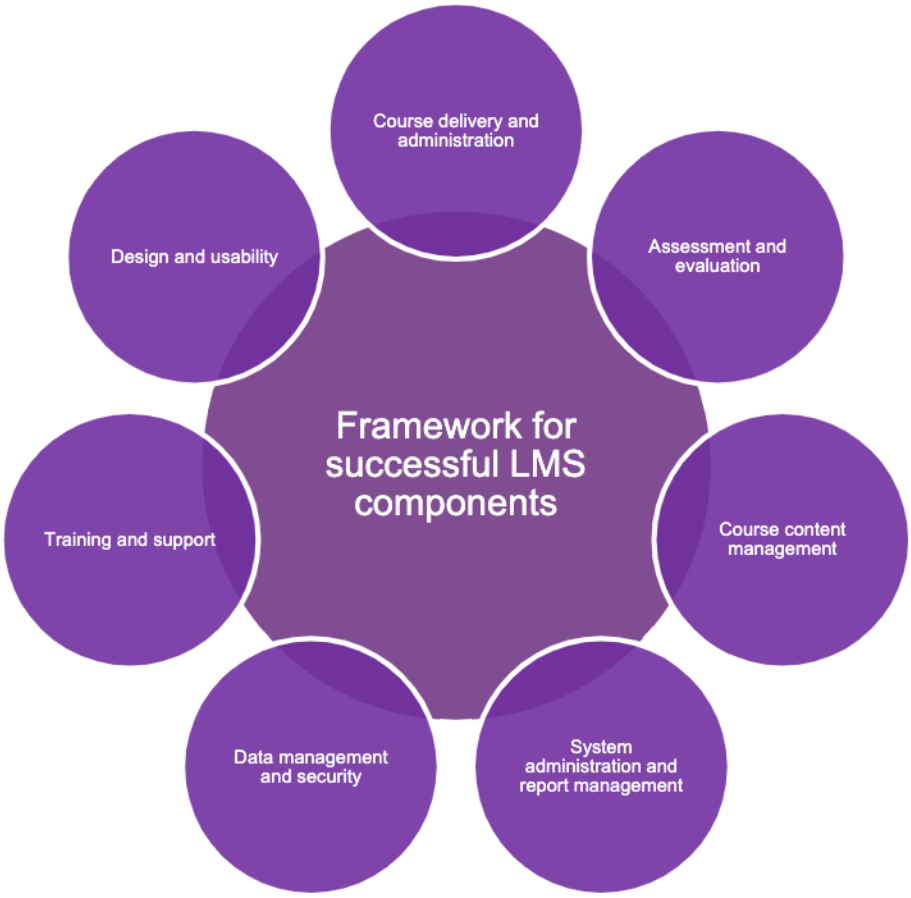
** Use statistics provided through provider website information, as of December 2020. Estimates include total users across all sectors, including higher education, private sector, and non-educational use.*

Features and Functions Desired in LMS

Going beyond simply LMS platforms, it is also worth noting that the Ministry of Education's efforts in KSA to provide learning content via the iEN broadcasting channels and via YouTube also compares favorably along the lines of other distribution models.

Below is a framework for the components and associated criteria KSA has established for an effective LMS, followed by a table benchmarking the top commercial LMS providers with Madrasati, related to those features:

After review of the international landscape, Madrasati is relatively peerless related to other nations' efforts to implement a countrywide LMS for e-learning in the K-12 education sector. That is, there are several other platforms, but none that equal the combination of scale and sophistication of what the Kingdom has initiated.



Course delivery and administration

- Robust capabilities for content and file organization and management
- Robust communication capabilities for synchronous and asynchronous communication between and across user roles
- Capability to embed/import and author rich content across content types.
- Support for Learning Tools Integrations and third-party content
- Calendar and selective release features allow for tracking of assignments
- Collaboration and social learning tools, including discussion boards, capability to create groups/sub-groups, and integration with file sharing tools and cloud storage solutions
- Online help and support for students.

Course content management

- Ability to organize content in and pull from a digital repository for content across subject areas, including varied file formats for universal access
- Rich content and media creation, including SCORM content
- User content download/upload available for offline use
- Search functionality

Assessment and evaluation

- Capability to create and grade multiple assessment types: quiz/test, file/link submissions, discussions.
- Quizzing/testing tool supports multiple question types
- Ability to selectively release assignments based on time, date, student ID, and other criteria
- Gradebook entry and access for students to track and gauge their own progress
- Gradebook export to student information systems (SIS) and other report
- The ability to link competencies and goals to performance and evaluation rubrics

System administration and report management

- Ability to archive, copy, and migrate existing courses, templates, and course files and templates
- Ability to grant access and assign privileges to roles at systems, course, and course group levels
- Ability to send notifications from multiple user roles across the system, including notifications from supervisors, administrators, and teachers.
- Ability to create standard reports across user roles, courses/trainings, as well as qualifications and program completion
- Ability to track and log students' activity, including content engagement, assessment completion/submission and interactions

Data management and security

- Encryption of secure and sensitive data
- Integration with student information systems, human resource management systems, and data management systems
- Authentication at industry standards for single sign-on (SSO) and other authentication protocols
- Regular system updating, backup, and security

Training and support

- Available online and/or print knowledge base, training materials, and how-to guides for multiple user roles
- Available opportunities for professional learning support across user roles, via formal trainings, webinars, and dedicated staff support
- Live support via phone, help ticket and support form submission

Design and usability

- Clear navigation and usable interface across user roles for navigating through courses, modules/content, notifications, and reports
- Responsively designed to support mobile devices and agnostic with respect to device types/platforms
- Multiple language support
- Support for accessibility considerations, including captioning and screen readers

Features Benchmarking: Madrasati with Top Commercial LMS Providers

Broadly, Madrasati's features and performance largely matches that of the top commercial providers. For a comparison to the providers here, please see the following chart:

	Top LMS Providers	Madrasati
Course delivery and administration	✔	✔
Assessment and evaluation	✔	✔
Data management and security	✔	✔
System administration and report management	✔	✔
Course content management	✔	✔
Training and support	✔	✔
Design and usability	✔	✔

Madrasati's Platform Tools

Madrasati includes a set of tools and interactive media that support the creation and management of virtual classrooms. For synchronous delivery, Madrasati leverages Microsoft Teams for videoconference class sessions and engagements. For asynchronous delivery, Madrasati serves as the access point for content – including recorded lectures and iEN channels – assessments, discussion forums, and other learning activities.

Some of the primary tools Madrasati supports for virtual learning are:

1. School schedule: Overall school schedules, including individual learner schedules, can be established and communicated.
2. Announcement and alerts: Announcements related to tasks, activities, and virtual classrooms are announced through the platform.
3. Lesson preparation: Teachers can prepare lectures, presentation slides, content and media files, as well as set agendas for class sessions and connect curriculum to established performance standards.
4. Virtual classrooms (via Microsoft Teams): Live, synchronous class sessions can be hosted through the platform, enabling remote/virtual instruction in real-time.
5. Discussion forums: Both teachers and learners can communicate, discuss, and exchange knowledge and experiences on the platform.

6. Exams and assessments: Learners can take exams, with instantaneous grading, feedback, and performance analytics. Oral exams may be conducted through Microsoft Teams functionality.
7. Attendance and behavior monitoring: Teachers can record daily class attendance and monitor and report on student behavior.
8. Homework and learning activities: Student learning activities and homework assignments may be downloaded and uploaded to submit through the platform.
9. Performance indicators: Madrasati can record users' activities and performance in the platform, enabling teachers and supervisors to monitor the performance and progress of the e-Learning process.
10. Reporting: The system provides insights into users' performance and activity through the platform.

Madrasati's Tools and Functionality by Role/User

Learners

The tools and functionality available to learners on the Madrasati platform include:

- Class preparation: School schedule and calendar
- Learning and course engagement: Virtual classrooms for synchronous and asynchronous instruction, E-learning content, and learning and enrichment activities
- E-learning content and activities: Rich content, including readings, lecture videos, and presentations are accessible for learners
- Assessments: Exams and assessment tools
- Communication features: Email, discussion forums, and teacher conferencing rooms
- Reporting and evaluation: Self-evaluation, reporting, and statistics dashboard

Teachers

The tools and functionality available to teachers on the Madrasati platform include:

- Course administration and management: School schedule and calendar, attendance and behavior management
- Instructional design and delivery: Lesson preparation, virtual classrooms for synchronous and asynchronous instruction, e-learning content, and learning and enrichment activities
- E-learning content and activity management: Rich content, including readings, lecture videos, and presentations can be created and uploaded by teachers
- Assessments: Exams, exam banks, and assessment tools
- Communication features: Email, discussion forums, and teacher conferencing rooms (to answer students)
- Reporting and evaluation: Reporting and statistics dashboard

Administrators

The tools and functionality available to administrators on the Madrasati platform include:

- School administration and management: School schedule setting, grading records setting, content and resources management and calendar, attendance and behavior management, and activities and projects classification
- Learner management: Administrators have access to student performance data and can track learner progress
- Teacher management: Administrators have access to teacher performance data and can evaluate teacher effectiveness
- Instructional design and delivery: Lesson preparation, virtual classrooms for synchronous and asynchronous instruction, e-learning content, and learning and enrichment activities
- Communication features: Email and discussion forums
- Reporting and evaluation: Reporting and statistics dashboard

Supervisors

The tools and functionality available to supervisors on the Madrasati platform include:

- Enrichment activities governance: Supervisors can establish enrichment activities, and monitor use data and learner progress
- Teacher evaluation: Administrators have access to teacher performance data, and can evaluate teacher effectiveness
- Communication features: Email and discussion forums
- Reporting and evaluation: Reporting and statistics dashboard

Parents

The tools and functionality available to parents on the Madrasati platform include:

- Student support: Access to school and resources and schedule and calendar
- Access to learner data: Parents can see how their learners are progressing through e-learning content and their performance on assessments
- Access to a variety of learning resources: Parents can access learning materials to supplement instruction for their children
- Communication features: Email and discussion forums
- Reporting and evaluation: Reporting and statistics dashboard

Benchmarking Nationally Supported LMSs

Even prior to the COVID-19 pandemic, the international picture of LMS implementation for virtual learning in K-12 education has been difficult to discern. That is, the extent to which countries around the world have formally adopted and/or mandated the use of a specific learning management system (or systems), particularly prior to the COVID-19 pandemic, is difficult to determine. This is due to the rapidly changing nature of nations' educational needs, capacities to plan for and implement large-scale technological support across their education systems, and the shifting landscape of LMS and ICT providers.

In many nations, local or regional governments and authorities most often assume responsibility for selecting and implementing LMSs, as well as for providing related support and access to e-learning content for educators. To the extent that national governments and ministries are involved in these processes, these national-level entities tend to occasionally provide some funding or other support and possibly technical specifications and/or learning outcomes and standards. More frequently, however, LMS solutions are not typically mandated for use across entire countries or regions. Once a solution is adopted by a nation, particularly from a commercial vendor, it does typically become the default or de facto LMS in use, due to the resource and technical support from a centralized authority.

Nevertheless, several reports over the past decade have shed light on how countries across the globe have developed e-learning solutions. Notably in 2011, the US Department of Education's Office of Educational Technology conducted a study of 23 nations and their approaches to implementing ICT, including the adoption of LMSs. The report found that only 6 of 23 countries participating in the international study of LMSs had formally adopted an LMS in all or nearly all of their schools. The study also noted that "regardless of levels of penetration, how ministries of education, local education authorities, and schools conceive of and use LMSs varies greatly by country" (U.S. Department of Education, Office of Educational Technology, 2011). Given that nearly a decade has passed since this report, the development of LMS technology and progress in the facilitation and pedagogy of effective e-learning has certainly increased. However, much of what is publicly available and known about the international use of LMSs leaves us in a similar place.

In a documentation of nation-by-nation e-learning responses to the COVID-19 pandemic, UNESCO (n.d.) has compiled a list of distance learning resources that many countries have made available to their

citizenry. Most of the resources in the list follow the distribution model, often linking to portals and websites that include content, rather than established or nationally supported LMSs. Some of the notable country supports are provided in the following section.

Adopted LMSs

An adopted LMS is simply an LMS deployed by an external vendor or provider. Most often, this takes the form of a commercial provider, such as Canvas, Blackboard, Schoology, or Google Classroom. An overwhelming majority of LMS deployments in K-12 institutions around the world are done through adopted solutions, as opposed to internally developed solutions or LMSs. Comparatively, adopted LMSs often have the benefit of requiring less technical expertise and effort to implement, as well as externally managed support and maintenance. The largest platforms also have deeper market penetration across education sectors, meaning that they tend to also offer robust content and training sharing.

Internally Developed LMSs

An internally developed LMS is one that is designed internally by an organization or school, rather than one that is purchased and deployed by a private firm. The origins of internally developed LMSs date back to some of the earliest days of e-learning itself, when many businesses and schools and universities did not have access to a diverse market of vendor options for LMS adoption. A recent analysis, eLearning Inside (2019), notes that most businesses and educational institutions have moved away from internally developed LMS solutions, given the costs, as well as the technical and logistical challenges of internal development, as well as the rich array of features that many purchased solutions provide. However, the development of an internally developed LMS does not necessarily suggest an inferior product. Rather, an internally developed LMS that aligns with the strategic goals and vision of the institution may well prove to be more effective, particularly given the rapid changes and growth in e-learning technology and pedagogy over the past decade. In this analysis, an internally developed LMS that can strategically align to the institution's vision, as well as provide the rich features that most off-the-shelf providers consider standard to their offerings, can be an even more valuable investment for the developing entity.

Internally developed LMS solutions are often paired with other supports, technologies, resources, and access points. Thus, solutions leveraging an internally developed LMS often provide students with supplemental benefits of a distribution system, including open resources and content repositories, broadcasted lessons via television and radio, and occasionally support for mobile phone credits or SIM cards. Use of national and public television and radio stations seems to be the primary mode of transmission for teaching resources and content, and largely these technologies and platforms are more widely available than broadband, high-quality internet access for many nations.

Coupled with distribution model resources, internally developed LMS solutions and widely available access to lessons have worked to ensure that students across the globe have had continued access to learning opportunities during COVID-19. A list of nations that have implemented their own LMS solutions, along with other supports, is displayed in Appendix A.

Considerations for LMS adoption

When implementing LMS for district, state, or even nationwide adoption, there are several key factors to consider, including: alignment; cost; functionality and capacity; visibility; pilot implementation; user and

technical support; customer opinion; data analysis and reporting capabilities. This section highlights the key components decision-makers generally need to take into consideration.

Alignment

One of the vital considerations for selecting an LMS – at any scale – is the alignment and fit with the overarching district/state/ministry goals and the extent to which the technology supports those institutional objectives. This alignment can take place along multiple dimensions, from pedagogical considerations like an emphasis on student personalization or project-based learning. The alignment can also take place along curricular grounds, including mandated or standardized curriculum.

Other considerations, including the need for at-home or distance learning, or blended or hybrid learning, should also be aligned. Ensuring alignment with broader goals and mandates, as well as other priorities and initiatives, will ensure that the chosen LMS does not cascade into a string of add-ons and service charges for what the provider considers to be services that require surcharges and extra fees.

Cost

Another critical factor that organizations must consider when adopting an LMS is the cost of the platform and the value delivered for the initial and ongoing costs of implementation and support for the platform and its related services.

Popular pricing models for LMSs often occur on a user subscription basis, incurring a regular fee per student, or on a licensing fee model. In addition to the ongoing cost of user access through subscription or licensing fees, there can also be significant costs to implementation, training, technical support, and maintenance. Many of these costs can be ongoing or prolonged, with some vendors wrapping these service costs into packages, and others offering them a la carte or on an as-needed basis.

Functionality and capacity

The functionality and interoperability of an LMS is a necessary consideration when implementing a new system. Leaders and administrators must account for the functionality they need from their LMS, identifying the use case needs of the various stakeholders who will use the system. For example, leaders must account for the needs learners will have, and should consider which functions and capabilities are essential or most needed. For large scale implementation, any nationwide or large-scale implementation will likely require robust e-learning capabilities, including course management, content and assessment delivery, flexible communication tools, data and reporting tools, and a high level of privacy and security.

Ease of use

An important consideration for the adoption of an LMS is the extent to which its users find it relatively accessible and usable, and the time horizon to build efficacy for use. This is particularly true in K-12 settings, where many young students are being introduced to technological tools for the first time, and when their capability to access systems requires the support of parents and/or other teachers and adults who can support them. During the COVID-19 pandemic, this factor has become even more critical, as many adults supporting learners were constrained with work or technological challenges themselves.

Pilot implementation

Pilot implementation is an important factor to consider for LMS adoption in many organizations, schools, and districts. This is primarily because the choice to adopt an LMS is such a large investment, particularly with respect to the complexity of integrating a new system into existing or legacy infrastructure, and to merging the LMS with any existing student information systems (SIS) or other reporting databases. The need to pilot includes and touches upon every other area of consideration listed here, from cost to support to privacy and security. Thus, it is paramount that any LMS adoption consider this factor.

Support

Support for any LMS adoption and implementation is another important factor that leaders must take into account. While many LMS providers offer platforms and functions that are user-centered and well-designed, users and stakeholders from every role across the system will need support for setting up and using the LMS. Administrators and technical advisors will need to liaise with LMS providers to work through technical requirements. Supervisors and managers will need to understand how to use the platform for personnel and performance indicators across both teachers and learners. Teachers will need the necessary and sufficient skills to use the system to deliver high-quality instruction and ensure learner performance management. Learners and parents will need to be able to access the system, engage in the course materials, complete assessments and gauge their progress. Across each of these domains of activity and different roles, the amount and availability of support provided to implementing organizations is critical to any successful LMS adoption.

Customer opinion

Fundamentally, any successful LMS adoption needs to meet its clients' requirements and satisfy their demands for performance. Thus, customer feedback is an important aspect to consider when adopting LMS solutions. Further, providers should consider users' knowledge of the institution and opinions about the system.

Reporting and data analysis

Given the demand for measuring and assessing student progress toward international and national education performance standards, as well as the need to provide stakeholders across the education system a view into schools', teachers', and learners' performance, any consideration for LMS adoption requires robust and functional data reporting and analysis capability. In addition to reporting on student progress, many LMS solutions offer reporting on the use and performance of the system itself, enabling leaders to make better decisions about resource allocation and providing the capacity to benchmark against strategic priorities. Thus, reporting and data analysis is a critical adoption consideration.

Recommendations for Future LMS Innovation

Several recent reports have noted the innovations and transformations that technology-enhanced learning may usher in across the education sector. CB Insights (2020), for example, noted that online learning increases access and invites a wide array of learners to participate in formal learning, including the important role LMS plays as an important component of this transformation. Further, the adoption of robust online learning was identified along with augmented and virtual reality (AR/VR) solutions, artificial intelligence (AI), gamification, and personalization in learning pathways as being potential drivers of innovation beyond COVID-19.

Elsewhere, in its 2020 report on the technology enablers driving K-12 innovation, the Consortium on School Networking (CoSN), a leading technology leadership organization for school leaders, identified five key drivers that support K-12 innovation: digital collaboration platforms, tools for privacy and safety online, analytics and adaptive technologies, cloud infrastructure, and mobile devices. While the primary driver, digital collaboration platforms, comprises the LMS itself, each of the other drivers connects to and springs from the services next generation LMS offerings provide. Thus, an effective and broadly distributed LMS has the capacity to drive innovation across schools, states, and indeed, nations. While the global pandemic has indeed forced education institutions and ministries to react, LMS offerings and their associated services create opportunities to innovate beyond the current crisis.

Future innovations in the domain of international K-12 education, including in the functionality and features of the Madrasati LMS, may want to consider that further incorporating emerging technologies and services could expand learning opportunities for students, and for their capacity building. Certainly, there are primary challenges to providing robust internet access to all citizens in many nations, particularly to those in rural and remote areas. Access to devices, supports for mobile learning, technically capable support staff and training resources, as well as strategic plans and policies for widespread adoption are all vital considerations. It is likely that nations that are able to account for and provide the infrastructure and support for these technologies may be able to expand on the gains in online learning they have seen during COVID-19.

Within the Kingdom of Saudi Arabia, future recommendations for the expansion of quality e-learning for K-12 education, and specifically for the Madrasati platform include:

Recommendation 1: Infrastructure Expansion

- Continue to expand infrastructure and access to internet and devices Expanding infrastructure and access will be important across the country, and particularly so in rural areas. While not germane to the functionality of Madrasati LMS itself, this recommendation remains vital for KSA in

its efforts to create and provide quality educational experiences for all learners. Beyond internet connectivity and access, the ability to access the platform through computing and mobile devices is also necessary to ensure that learners continue to the use the platform to its fullest capabilities. This may include continued support for mobile users or for those who may need to access the platform primarily through a phone or mobile device.

Recommendation 2: Learning Support and Integration

- Expand the breadth of availability and support for learning technology integration (LTI) tools. Similar to Madrasati's current interoperability with Microsoft Teams, expanding and developing integrations with Madrasati will offer educators more flexibility and creativity with content creation and sourcing, and will enable students a variety of ways to demonstrate their learning and be creative. Furthermore, integration with other tools may allow for rich content.

Recommendation 3: Educator Training

- Expand support, training, and professional development for educators and administrators. As a pathway toward innovative e-learning beyond the remote response to COVID, teachers and administrators will need continued professional learning and support for emerging best practices and pedagogy. They will also need networks and peer-to-peer support systems to build collegiality and shared communities of practice.

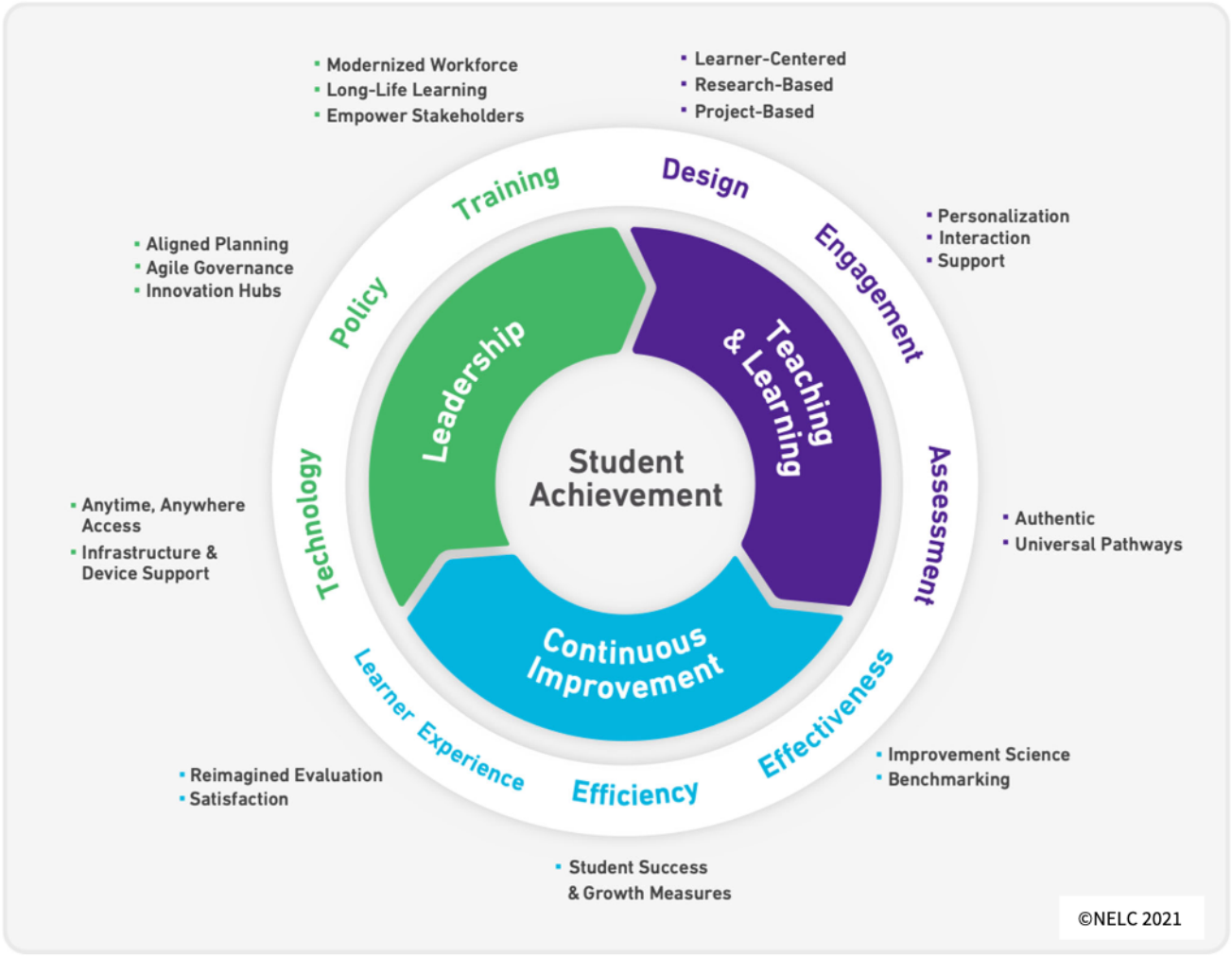
Recommendation 4: LMS Research Program

- Develop a research program to study Madrasati's use and effectiveness. The KSA might consider implementing research or continuous improvement networks to gather insights on learner, educator, and even parent use of the platform to improve user experiences across these roles.

While the efficacy of cybersecurity and privacy are beyond the scope of this analysis, all ministries and nations should be attuned to the continual challenges and threats to data privacy and security.

Nevertheless, with the powerful combination of the Madrasati LMS and the bundle of resources, broadcasted and streaming lessons, and digital textbooks, the nation is poised to lead the globe as a model for e-learning in K-12 education.

Emergent K-12 Online Learning Framework



Based in part on the COVID-19 experience and recent focus of the Ministry of Education around inclusive digital learning programming, instruction, and tools, the above framework is a useful organizing construct for the work planned and being pursued at present to ensure unparalleled student achievement for all learners as well as to embody a continuous improvement spirit necessary for 21st century education. The NELC K-12 Online Learning Framework centers student achievement as the foundational aspiration and outcome of primary and secondary education in the Kingdom of Saudi Arabia. In this way, each strategic dimension and supporting initiative and implementation should make a contribution toward helping students in the Kingdom reach their fullest potential and is undertaken with a goal and realization of heightened student achievement at the core.

Extending from this framework are the core strategic dimensions of this framework: Leadership, Teaching & Learning, and Data-Driven. Each dimension extends to supporting sub-dimensions and their associated activities. These core dimensions serve as the conceptual pillars for future strategic direction in the Kingdom's efforts to modernize, expand access, and deepen support for teachers and leaners as continued opportunities arise to maximize learning in digital spheres.

Leadership

Research has shown that effective leadership in schools matters and is connected to student achievement (Bryk et al., 2010; Leithwood & Jantzi, 2008; Orphanos & Orr, 2014). This framework dimension accounts for leadership—both positional and behavioral elements—that are necessary to drive innovation and future student achievement in Kingdom of Saudi Arabia. Leadership subdimensions include Policy, Technology, and Training. Each of these subdimensions and their related strategic supports are described in the following sections.

Policy

Policy accounts for the administrative and regulatory supports and guidelines that govern the operations and delivery of educational services. Across the leadership dimension, strong policies emphasizing and supporting student achievement are critical to the overall success of primary and secondary educational outcomes. In particular, policies that expand digital and online learning, whether in fully online modalities or as part of a blended strategy, should be expanded.

Strategic supports for the Policy subdimension are:

- Aligned Planning: Clear strategic alignment, both vertically and horizontally, is necessary for effective policy development and implementation. Vertically, the policies and expectations should align vertically from an overarching vision and mission from the Ministry of Education, and be seen on the ground level of schools. Horizontally, each level of education administration should have common understandings and planning supports for their unique role, value, and contribution to the broader policy objectives.
- Agile Governance: In a world of rapid change and increasing complexity, effective and responsive governance is vitally important. As such, the structures and processes through which ministries and governing bodies administer education should include a design to share the authority and capacity to develop policies and decision-making that affect the entire educational ecosystem.
- Innovation Hubs: As Cook (2019) has described, complex and fast-paced systems can be difficult places to innovate. As such, "zones of exemption" at the margins of such systems provide rich spaces to experiment and capture learning for innovations that might begin to filter back in, or even subsume, components of the existing system. In this way, the establishment of "innovation hubs" where administrators and practitioners claim the permission or freedom to negotiate policies and guidelines in service of innovative pilot programs and implementations can support continuous improvement in policy. It is recommended that these hubs operate within continuous improvement or action research frameworks, so that innovations can be captured, improved upon, and disseminated system-wide.

Technology

While technological capacity and capabilities are essential for enabling online learning at a fundamental level, dedicated attention to technology as a core element of the Leadership dimension extends beyond the mere functional capacity to deliver online learning.

Strategic supports for the Technology subdimension are:

- Anytime, Anywhere Access: The expansion of online and digital learning in primary and secondary education creates the possibility for new and innovative delivery and engagement modalities. The mantra of *anytime, anywhere* means that both educators and learners can creatively think about what it means to *go to school*, and for what progression through a course or school year looks like. For students, this creates flexibility to continually review lessons and pace themselves appropriately. While for teachers, this creates opportunities to provide more personalization at scale.
- Infrastructure & Device Support: As previously noted in the recommendations section, the capability for students and educators to be online and connected to educational opportunities is perhaps the most fundamental consideration for enabling online learning. In this way, students and educators must have robust and consistent access to the Internet, as well as the devices to participate in educational services. Ensuring ubiquitous and reliable Internet, as well as creating ways to secure devices and/or making digital learning environments friendly for many device types, should be considered critical infrastructure priorities in education.

Training

A final but important component of the Leadership dimension is the need for robust training—both inside of the primary and secondary education system with respect to professional development. Strategic supports for the Training dimension include:

- Modernized Workforce: A key element in developing training for the Leadership dimension will be to transform teacher preparation programs in order to better develop teacher knowledge and skill in areas which align to the student achievement foci across the other dimensions and subdimensions. This could include the redesign of teacher licensing and credentialing, so that teacher competencies are aligned with learner-centered and competency-based practices that demonstrate mastery. Create incentives for teachers to earn the credentials necessary for teaching dual or concurrent enrollment courses. This also includes a need to diversify the teacher workforce, as well as to invest in both technology competencies and cultural competencies for educators.

- Long-life Learning: As Dede and Richards (2020) have offered, the notion of *long-life learning* suggests that that adults will need to continue to explore new skills and gain new knowledge long after primary and secondary, or even higher education experiences. In this way, the inclusion of long-life learning as an emphasis of the training subdimension demonstrates the need to continually provide those in the primary and secondary education sector with the opportunities to continue to learn and grow through their practice, whether they are a teacher, administrator, or other support personnel. Just as the students of today will need to continue to learn throughout their lives, educators and those working to support education in the Kingdom must also have access to formal and informal learning opportunities throughout their careers.

- Empower Stakeholders: Across roles within both primary and secondary education sectors, it is critical that students, educators, and parents all have the knowledge and efficacy to use digital tools, devices, and applications. To this end, investment in both formal and informal learning opportunities, and the development of communities of practice that can support and extend learning is vital.

Teaching & Learning

Teaching and learning are the core functions that take place in educational settings, and as education transforms and shifts with advances in technology and society, the importance of teaching and learning have never been more essential. However, the ways in which teaching and learning contribute to student achievement must innovate and continue to improve, particularly with increased connectivity and capability to integrate new modalities of learning and dynamic learning environments that both reinforce and extend beyond students' experiences in the classroom. Teaching and Learning subdimensions include Design, Engagement, and Assessment. Each of these subdimensions and their related strategic supports are described in the following sections.

Design

As Richter and Allert (2017) have noted, school is itself a product of design, of artificiality that is not immaterial but rather contingent upon the socioeconomic contexts in which it functions. Thus, the ways in which educational experiences are designed may be a matter of continual interrogation, reimagination, and revision. For this subdimension, three strategic supports emerge to drive a learning design that meets the aim of student achievement above all.

These strategic supports for the Design sub-dimension are:

- Learner-Centered: Online offerings should adhere to best practices for user experience (UX) design, and should adhere to quality standards for how to best support learners as they navigate digital and online spaces. Content should be appropriately chunked to manage cognitive load, and should be engaging and include a variety of media types and modalities to fit learners' needs, rather than simply to fit what educators have always done.

- Research-Based: Educational research and inquiry continue to illuminate and inform best practices across contexts and sectors. Yet as Berliner (2002) has noted, educational research as a science deals with enormous complexities and challenges—all of which are centrally focused on human beings and how we teach them. In this way, the design of online K12 education moving forward should be informed and based on trusted and emergent educational research. Furthermore, a robust program of educational inquiry should accompany online and digital learning strategies, to contextualize and disseminate learnings within the Kingdom.

- Project-Based: As Kereluik et al. (2013) and many others before have asked, *what knowledge is of most worth?* More and more, both educators and students are being pushed beyond the acquisition and demonstration of mere *content knowledge* in educational contexts, as the demand for transferability and applicability—or to put it flatly, relevance—in learning is at an all-time high. To help students develop the critical thinking, collaboration, and humanistic skills that are necessary to make their learning relevant beyond formal learning settings, project-based learning is essential.

Engagement

As educational opportunities expand through digital and online learning, emphasis should be placed on the ways in which educational experiences enliven students' curiosities, interests, and commitments to their futures, as well as to the collective benefit of society. In this way, engagement is an integral component of the Teaching and Learning dimension.

The strategic supports for the Engagement subdimension are:

- Personalization: Personalized learning opportunities create the space for learner autonomy and agency to drive their own learning. In personalizing pathways, learners can deepen their understanding of themselves as human beings, and experience learning that is relevant, challenging, contextualized, and designed for their needs (LEAP Innovations, n.d.). As learners gain confidence, they can also begin to challenge themselves and demonstrate their learning in multiple ways.

- Interaction: Learning is inherently a social enterprise, where communities of practice (Donner, 2021; Wenger, 1998) can enrich and reinforce the power of learning experiences. This is particularly true in online environments, where the social presence (Richardson & Swan, 2003) of a course impacts students' sense of perceived learning and satisfaction. With the expansion of social (and social media) integrations into learning applications and modalities, increased interaction supports learner engagement—and ultimately achievement.

- Support: From advance tutoring and feedback related to performance, to routine technical or navigation support for a course, the ways in which students are supported has tremendous impact

on their engagement and achievement. Within this framework, centering the needs of students and how they can be supported is critical for overall success, which lies at this framework's heart.

Assessment

Assessment of and for learning plays an important role within the practice of teaching and learning, and can be an overlooked area for innovation.

The strategic supports for Assessment are:

- Authentic: The days of standardized testing and skill-and-drill style assessments must come to end, as we move into the second quarter of the 21st century. With advancements in technology and delivery capability, assessments must be tied to how students share and demonstrate their knowledge—hopefully for some social or broader impact than just to satisfy a teacher's requirements. Grading systems like mastery grading or even ungrading can create powerful learning experiences and remove the fear of compliance for students who will be counted on to contribute toward cognitively and socially complex challenges as adults.

- Universal Pathways: Universal pathways are an emerging idea (see: Casey & Patrick, 2020) that seek to "develop each individual's agency and ability to navigate pathways that will cross multiple sectors and institutions over the course of their lives." Universal pathways take the notion of a standard curriculum, and its assessments, and create unique flexibility for the *how* and the *what* of delivery. These pathways seek to support balanced systems of assessments to support learning and recognize competencies, rather than standardized tests.

Continuous Improvement

As online and digital learning expand across the nation, it will be critical for leaders, as well as stakeholders at every level, to have a sense of the success and need for improvement with the primary and secondary education sectors. However, this dimension takes on the name Continuous Improvement as a key conceptual cornerstone for the notion that no measures or indicators of success will ever be final or complete. Just as economies and social institutions are a continual work in progress across a nation, so too should its system of K12 education be. And as digital and online learning continue to expand, this will become even more important as a driver of innovation and service delivery.

Effectiveness

The stakes for successful provision of educational services and student achievement have never been higher, particularly on a global scale. To this end, the effectiveness of educational service delivery must be a nationwide priority for primary and secondary education. Within this subdimension, and emphasis on networked learning and broad benchmarking for effective practices should become the new norm for online learning across the Kingdom of Saudi Arabia.

The strategic supports for the Effectiveness subdimension are:

- Improvement Science: The emerging field of improvement science (Bryk et al., 2015; Lewis, 2015) offers an enlightened approach to traditional measurement and evaluation that empowers practitioners who are subject to such measurement and evaluation to participate in the improvement process. As the recent investment by the Bill and Melinda Gates Foundation into networked improvement communities (NICs) suggests, a powerful method for supporting systems change and improvement comes from cyclical, action-oriented approaches to data collection and innovation efforts, led in part by participants themselves. A nationwide effort to create NICs at scale would create dynamic learning opportunities and robust datasets for evaluation that perhaps no other nation has dared to undertake.

- Benchmarking: While traditional rank-order data collection and evaluation has long, benchmarking practices and broad data sharing still has a valuable place. Benchmarking effective schools, teachers, leaders, and practices can inform the development of supports where needed, as well as propel successful innovations. As the Madrasati benchmarking component of this report has shown, having contextual knowledge of the landscape is a critical factor for success in large-scale systemic efforts.

Learner Experience

With respect to performance evaluation, schools and systems of education can often yield volumes of data to be analyzed. Yet, the experiences of the learners may be a space where ministries of education can do more to understand the impact and efficacy of their service delivery. To this end, the Learner Experience subdimension seeks to account for the ways in which broad systems of data collection, tracking, and analysis might more deeply target creating profiles and rich understandings' of students experiences as a way to support student achievement.

Strategic supports for the Learner Experience subdimension include:

- Reimagined Evaluation: Schools can no longer afford to be designed around the notion of the *average student* and conducted as one-size-fits-all approaches to mass delivery (Rose, 2016). To pay credence to the notion that each student is unique and has unique potential to succeed, education systems must be responsive to their individual needs and provide opportunities for each student to develop and grow in their own way. To this end, efforts to personalize learning, both with respect to what and how they learn, will be essential.

- Satisfaction: As this framework centers student achievement, it is perhaps fitting that a final dimension of this framework ought to relate to a commitment to provide those students with a satisfactory experience or set of experiences. Indeed, student feedback is often an overlooked component for improving the quality of educational experiences. In this way, emphasizing student satisfaction and seeking student input in systemic and structured ways will likely lead to more positive outcomes across the system as a whole, including increased student engagement, higher levels of student and instructor trust, and the ultimate goal of student achievement.

Efficiency

National efforts to promote innovation and realize the vision of student success for all will require broad commitment and effort across the other elements addressed through this framework. However, it will also be important to capture data and insights about the effectiveness of educational efforts and gauge the progress that students are making toward the ultimate goal of student achievement. To this end, the Efficiency subdimension supports the overall Continuous Improvement dimension.

Strategic support for the Efficiency subdimension includes:

- Student Success & Growth Measures: While other elements of this framework promote assessment and teaching and learning practices that move beyond mere standardized assessments, there is still value and much to be learned from international large-scale assessments (ILSAs), including the PISA, and. As Singer et al. (2018) shared, such large-scale assessments, as well as other summative assessment measures, allow ministries to *describe and compare* student achievement and examine relevant contextual factors; *track changes* over time in student achievement; *disturb complacency* about a nation's education system and to spur educational reforms; *create de facto international benchmarking* by identifying top performing nations and jurisdictions; *evaluate the contextual effectiveness* of curricula, instructional strategies, and educational policies, and *explore causal relationships* between contextual factors (p. 70-71). In this way, such assessments play a valuable, contextualized role for illuminating other innovation efforts, and provide insights for future strategic directions across all three dimensions of the framework.

Conclusion & Next Steps

The Kingdom must build from the circumstances that led to massive scale online learning during the COVID-19 Global Pandemic. Its post-pandemic future can be rich with blended learning opportunities when that makes the most sense for schools, more differentiated student support, and extended job-imbedded professional learning for teachers to be ready to meet planned and unplanned opportunities for on-demand digital learning leadership.

The COVID-19 pandemic has been a disruptive and tragic event that continues to unfold across the globe, at the time of this writing, affecting billions. Numerous sectors and institutions of daily life have been altered, and the education of the world's youth is one of the primary areas in which this disruption has occurred. To that end, any mention of progress or opportunity must acknowledge the tremendous loss, strain, and challenge that the pandemic has created. Yet in some respects, the outbreak of COVID-19 has occurred contemporaneously with and perhaps been a driver of innovations in remote and e-learning.

Concluding Remarks on Online Learning

A common challenge in online learning is the use and planning of teaching when time is flexible, in real-time and over time. Through an online readiness intervention to provide students and parents skills in managing their time, such as planning of time, scheduling of time for homework and live class meetings, time for connecting with teachers and classmates, and time management tools and techniques, students and parents will become more competent and satisfied with their experience. As teachers better understand how to use asynchronous and synchronous mediums of communication and interaction more effectively for their teaching goals through experience and professional development, satisfaction with time online and time management has the potential to improve.

Teachers, parents, and students can incorporate time management and technology skills building techniques to improve student outcomes and stakeholder satisfaction across the groups.

With continued growth in the access of affordable laptops and Internet, student and parents can learn how to more successfully learn online and at a distance through an online learning readiness intervention, while teachers can be supported through new professionally development opportunities to help them harness the characteristics of a flexible learning model in better understanding temporal elements of online learning while creating engaging and fun experiences for students.

Concluding Remarks on LMS Benchmarking

Related to the Madrasati LMS, this report has sought to analyze and benchmark the considerations for and global adoption of learning management systems in K-12 school settings, relative to the KSA's development and launch of its Madrasati e-learning platform. While the COVID-19 pandemic has undoubtedly disrupted traditional in-person learning and accelerated the need for high-quality online and blended learning options for billions of learners, there is evidence from KSA that Madrasati is a step in the right direction toward that aim.

A review of the global landscape for LMS adoption shows that while more and more nations are offering cloud-based, widely available commercial solutions for schools and districts from their regional or national level authorities, there is still much discrepancy between what different nations are doing. Challenges related to technological infrastructure, resourcing, geographic and political challenges, and the still emerging development of e-learning capacity for various stakeholders present a variety of hurdles to those developing e-learning solutions – not to mention the disruption of the pandemic itself.

Of the remedies that national governments and ministries of education have sought in effort to maintain continuity of educational and schooling services to learners across the regions, KSA's Madrasati e-learning platform shows unique promise and a unique position to support learning for all of the country's students. Indeed, at the time of this writing it is likely that the Madrasati LMS is the most widely deployed internally developed LMS in operation, in terms of number of users and available e-learning courses and content. In the first semester, the platform engaged more than 6 million users, including up to 99% of the Kingdom's learners and their parents.

On the whole, the Madrasati platform compares favorably with contemporary commercial offerings distributed across the globe. Like the commercially available learning management systems, the Madrasati platform provides benefits to a variety of stakeholders, including learners, teachers, administrators, supervisors, and parents. Each has a unique user role and set of capabilities within the platform that contributes to the overall success of learners in KSA. The platform's features and benefits also compare favorably with the overarching strategic considerations for LMS implementation, including alignment, cost, power and durability, support, reporting and analysis.

What makes Madrasati unique in the contemporary global e-learning landscape in the K-12 education sector is that it is an internally developed LMS developed and launched to its national audience, supporting KSA's standards-based curriculum. Moreover, the platform *launched* in the fall of 2020, at a time when the constraints and challenges of the pandemic ensured that its introduction would be subject to maximum use and strain. While we do not have a full picture of the system's capability and efficacy, the context for the development and launch alone suggest that the Madrasati platform has already accomplished something special.

Future possibilities for the Madrasati e-learning include further support of learning technology integration (LTI) tools, similar to its interoperability with Microsoft Teams. These integrations could include partnerships with content providers and publishers, as well as with third party software providers of student engagement tools, content creation and curation, and plagiarism detection, for example. Across KSA, further development and distribution of access to high-speed internet and computing devices would also support both synchronous and asynchronous learning opportunities for learners across the nation.

The future state of the pandemic, and for global life itself, is of course unpredictable. However, we can be sure that nations will continue to support and nurture their learners' development and growth, particularly in the realm of e-learning. With the Madrasati platform, the Kingdom of Saudi Arabia is well-positioned to continue that effort.

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Appendix A:
K-12 Initiatives

Dimension: Leadership			
Subdimensions		Initiatives	Achievement Level
Governance	1	Provide specific and timely communication related to fluidity with COVID and online learning	Done
Strategies	2	Comprehensive strategic planning to account for any discrepancies or disparities between planning goals and organizational alignment	Done
Policies	3	Policies that meet the needs of quality and innovative online teaching and learning	In Progress
Process	4	Processes that clarify teacher performance evaluation	Done
Resource Allocation	5	Explore opportunities for equitable resource allocation for schools	In Progress
	6	Processes that incentivize teacher participation in training and professional learning for online teaching	Done
Staffing & Innovation	7	Create pathways for innovation in online teaching and learning	In Progress

Dimension: Curriculum & Design Planning			
Subdimensions		Initiatives	Achievement Level
Instructional Design Methods & Universal Design for Learning (UDL)	8	Embrace instructional design practices like UDL explicitly in the design of curricula	Done
Learning Objectives	9	Create opportunities for student participation in meaning-making around course learning objectives, and to articulate what success means in a way that they can understand and begin to own	Done
Alignment	10	Teachers clarify learning outcomes that align with guidelines regarding standards for instructional planning	In Progress
Course Materials & Content	11	Regularly review course materials and content	In Progress
	12	Regularly update course materials and content with current and media-rich sources	In Progress
Innovation	13	Encourage teachers to be more pedagogically or technologically innovative	Done

Dimension: Online Teaching & Learning

Subdimensions		Initiatives	Achievement Level
Communication	14	Establish expectations for responsiveness	Done
Engagement	15	Implement both formal and informal opportunities for students to interact with each other and the teacher	Done
Expectation Setting	16	Develop, define, and communicate expectations for student activity	Done
Outcomes	17	Develop and implement student learning outcome metrics for online courses	In Progress
	18	Communicate findings, including onsite comparisons as appropriate	In Progress
	19	Clearly articulate criteria for assignments	In Progress
Course Interaction	20	Support teacher-to-student and student-to-student interactions	In Progress
	21	Establish online presence of the educator	Done
Feedback	22	Develop and communicate methods for providing feedback, and set expectations for timing and explanations of how feedback is related to learning objectives	Done
Innovation	23	Explicitly encourage innovation through communications, activities, and professional development	Done
	24	Develop and implement professional development opportunities on innovative teaching and student support	Done

Dimension: Assessment

Subdimensions		Initiatives	Achievement Level
Assessment Strategies	25	Elaborate and implement subject-related communications to students regarding assessments, their objectives and overall learning outcomes	Done
Assessment Processes	26	Promote open dialogue with all members of the educational process	Done
	27	Ensure that assessments pursue generally accepted best practices and directly correlate to teacher expectations	Done
Assessment Methods	28	Use diverse assessment approaches and techniques to better meet various students' needs	Done
Innovation	29	Encourage innovative assessment through communications, activities, and related professional development	In Progress
	30	Develop and implement professional development opportunities on innovative (ICT- based) assessment	Done

Dimension: Technology

Subdimensions		Initiatives	Achievement Level
Centralized Online Education Infrastructure	31	Identify schools that have not yet implemented online learning and provide a centralized LMS with SSO	In Progress
Operability	32	Develop a feedback loop to ensure parent and student needs are met	Done
	33	Create centralized resources that are comprehensible and policy accessible for parents and students	Done
Modality	34	Evaluate student experience over time	Done
	35	Reflect on course design and areas for improvement based on needs	Done
Security	36	Develop a clear data security plan and share with stakeholders	Done
	37	Develop policies around the use of third-party applications	Done
Information Technology Service Management (ITSM) Compliance	38	Determine IT pain points among stakeholders	In Progress
	39	Evaluate current processes, plans and resources	Done
	40	Develop new resources to address pain points	Done
Internet Access	41	Identify student internet needs	Done
	42	Develop a distribution plan to share mobile hotspots	Done
	43	Evaluate course content to ensure options for students to continue work with poor internet	Done
Reliability	44	Develop processes for monitoring and addressing the reliability of infrastructure and learning technology systems and courses	Done
Coverage	45	Stakeholders have multiple ways to report needs	Done
	46	Periodic follow-ups and opportunities to acquire new technologies	Done
Innovation	47	Curriculum modification to include gaining experience working with student data at different levels of granularity	Done

Dimension: Student Support

Subdimensions		Initiatives	Achievement Level
Student Orientation and Support	48	Develop and implement comprehensive online course orientations	Done
	49	Develop sufficient academic support resources	Done
	50	Implement digital access for academic support resources	In Progress
Equity	51	Develop and implement appropriate evaluations to assess student support needs	Done
	52	Develop and implement student support solutions that may be accessed at a distance	Done
Accessibility	53	Review the use of accessibility standards in online courses and ensure that gaps are addressed	Done
Compliance Standards	54	Review online courses for compliance with accessibility standards	Done

Social Emotional	55	Develop and implement appropriate evaluations to assess social emotional student support needs	Done
	56	Develop and implement social emotional student support solutions that may be accessed at a distance	Done
	57	Develop and implement opportunities for students to build relationships and communities within their courses	Done
Innovation	58	Discover and implement innovative methods of communicating with students in online courses	Done

Dimension: Training & Support

Subdimensions		Initiatives	Achievement Level
Technical Assistance	59	Create a centralized support space through a website/education portal	Done
	60	Resources explicitly shared and stressed by teachers in syllabi and online course, and school	Done
Professional Development	61	Continuing professional subject- and technology-related training and support for teachers to develop the knowledge, skills, and abilities essential for designing and giving online classes	Done
	62	Extend and reinforce teachers' professional advancement and promote educators' capacity building	Done
Orientation	63	Develop, test and share common orientation modules for schools	Done
Mentoring	64	Design a virtual peer support (peer observation/peer evaluation) and mentoring program for collegial learning groups	Done
Innovation	65	Develop a teacher learning community program	In Progress

Dimension: Evaluation & Continuous Improvement

Subdimensions		Initiatives	Achievement Level
Evaluation of Course Outcomes & Program Quality	66	Processes, procedures, and policies on course and program evaluation, including review and updating, are developed and implemented	Done
Student Satisfaction	67	Create a communication plan for students and parents regarding evaluation opportunities, purposes, and uses	Done
	68	Show students and parents how their feedback has helped to improve the online learning courses or program	Done
Teacher Satisfaction	69	Create a communication plan for teachers regarding evaluation opportunities, purposes, and uses	Done
Staff Satisfaction	70	Create a communication plan for staff regarding evaluation opportunities, purposes, and uses	Done
Innovation	71	Implement best practices identified by online learning experts	Done

Appendix B:
List of National LMS Providers

Country	LMS / platform	Internal vs. commercial development	Estimated peak users	Other supports
Argentina	Educ.ar	Internal	Not available	Television broadcasts; radio broadcasts
Austria	Moodle; Eduthek	Commercial; Internal, developed with commercial vendors	Not available	Digital content repositories
Bhutan	Bhutan e-Learning platform	Internal	Not available	Digital resources and textbooks
China	Empower Learning; Educloud	Internal, developed with commercial vendors	Not available	Television broadcasts; online content repositories
Colombia	Aprender Digital	Internal	Not available	Television broadcasts; radio broadcasts
Cote D'Ivoire	Mon École à la Maison ("My School at Home")	Internal	Not available	Television broadcasts; radio broadcasts
Egypt	Edmodo	Commercial	22 million	SIM cards available free of charge for mobile users; television broadcasts; OER content repositories
Greece	Mathainoume-stospiti	Internal	9.4 Million	Television broadcasts
Lebanon	MEHE LMS	Internal	Not available	Television broadcasts
Jamaica	In development	Internal	Not available	Television broadcasts
Jordan	Darsak	Internal	Not available	Television broadcasts
India	DIKSHA; e-Pathshala;	Internal	Not available	Television broadcasts; online content

	Swayam			repositories
Libya	Libyan e-Learning Portal	Internal	Not available	Television broadcasts
Mexico	Aprende 2.0	Internal	Not available	Television broadcasts; radio broadcasts; online content repositories
Myanmar	Myanmar Distance Education Platform (MDEP)	Internal	Not available	Television broadcasts; YouTube channel
Poland	Epodreczniki.pl	Internal	Not available	Television broadcasts; digital resources and textbooks
Rwanda	REB e-learning platform	Internal	Not available	Radio broadcasts; digital resources and textbooks
Serbia	Moja Škola ("My School")	Internal	Not available	Television broadcasts; radio broadcasts
South Korea	EDUNET (e-Hakseupto & Waedorang as LMSs)	Internal	5.4 Million	Educational Broadcast System (TV); digital textbooks;
Trinidad and Tobago	Ministry of Education Online Learning Platform	Internal, with Microsoft 365 login	Not available	Television broadcasts
Turkey	EBA (Eğitim Bilişim Ağı)	Internal	18 Million	Television broadcasts; digital resources
United Arab Emirates	Learning Curve LMS	Internal	Not available	Access to Madrasa.org, an open educational platform
Vietnam	Tap Huan LMS	Internal	Not available	Commercial provider: free integration w/Google Suite enterprise ($)

ONLINE LEARNING CONSORTIUM

Appendix C:

Analysis of National K-12 eLearning Solutions

Country Name	Online Platform	OER/MOOCS	e-Content	YouTube	Satellite TV
Afghanistan	No	No	No	No	Yes
Albania	Yes	No	Yes	Yes	Yes
Algeria	Yes	No	Yes	Yes	Yes
Andorra	No	No	No	No	No
Angola	No	No	No	No	Yes
Anguilla	Yes	No	No	No	No
Antigua and Barbuda	Yes	No	No	No	No
Argentina	Yes	No	Yes	No	Yes
Armenia	Yes	No	Yes	Yes	No
Aruba	No	No	No	No	No
Australia	Yes	No	Yes	No	No
Austria	Yes	No	Yes	No	No
Azerbaijan	No	No	Yes	No	No
Bahamas	Yes	No	Yes	No	No
Bahrain	Yes	No	Yes	No	No
Bangladesh	No	No	Yes	No	No
Barbados	No	No	No	No	No
Belarus	No	No	No	No	No
Belgium	No	No	Yes	No	No
Belize	No	No	Yes	No	No
Benin	Yes	No	No	No	No
Bermuda	No	No	No	No	No
Bhutan	No	No	No	Yes	Yes
Bolivia	No	No	No	No	Yes

Country Name	Online Platform	OER/MOOCS	e-Content	YouTube	Satellite TV
Latvia	Yes	No	No	No	Yes
Lebanon	No	No	No	No	No
Lesotho	No	No	No	No	No
Liberia	No	No	No	No	Yes
Libya	Yes	No	Yes	No	Yes
Liechtenstein	No	No	No	No	No
Lithuania	Yes	No	No	No	No
Luxembourg	Yes	No	No	No	No
Madagascar	Yes	No	No	Yes	No
Malawi	Yes	No	No	No	No
Malaysia	Yes	No	Yes	No	Yes
Maldives	Yes	No	No	Yes	Yes
Mali	Yes	No	No	No	Yes
Malta	Yes	No	Yes	No	Yes
Marshall Islands	No	No	No	No	No
Mauritania	Yes	No	No	No	Yes
Mauritius	No	No	Yes	No	Yes
Mexico	Yes	No	Yes	No	Yes
Micronesia	No	No	Yes	Yes	No
Moldova	Yes	No	Yes	Yes	Yes
Monaco	Yes	No	No	No	No
Mongolia	No	No	Yes	Yes	Yes
Montenegro	Yes	No	Yes	Yes	Yes
Montserrat	No	No	No	No	No

Bosnia and Herzegovina	No	No	No	No	No
Botswana	No	No	No	No	Yes
Brazil	No	No	Yes	Yes	No
British Virgin Islands	No	No	No	No	No
Brunei Darussalam	No	No	No	No	No
Bulgaria	Yes	No	Yes	No	Yes
Burkina Faso	No	No	No	Yes	Yes
Burundi	No	No	No	No	No
Cabo Verde	No	No	Yes	Yes	Yes
Cambodia	No	No	No	Yes	No
Cameroon	No	No	No	No	Yes
Canada	Yes	Yes	Yes	Yes	No
Cayman Islands	Yes	No	Yes	No	No
Central African republic	No	No	No	No	Yes
Chad	Yes	No	No	No	No
Chile	No	No	Yes	No	No
China	Yes	Yes	Yes	Yes	Yes
Colombia	Yes	Yes	Yes	No	Yes
Comoros	No	No	No	No	No
Congo	No	No	No	Yes	Yes
Congo DR	No	No	No	No	No
Cook Islands	No	No	No	No	No
Costa Rica	Yes	No	No	Yes	No
Cote d'ivoire	No	No	No	No	Yes
Croatia	Yes	No	Yes	No	No

Morocco	Yes	No	Yes	No	Yes
Mozambique	Yes	No	No	No	Yes
Myanmar	Yes	No	Yes	Yes	Yes
Namibia	Yes	No	No	No	No
Nauru	No	No	No	No	No
Nepal	Yes	No	Yes	Yes	Yes
Netherlands	Yes	No	No	No	Yes
New Caledonia	No	No	Yes	Yes	No
New Zealand	Yes	No	Yes	No	Yes
Nicaragua	No	No	No	No	No
Niger	Yes	No	No	Yes	No
Nigeria	Yes	No	Yes	Yes	Yes
Niue	No	No	No	No	No
North Macedonia	No	No	No	No	No
North Korea	Yes	No	No	No	Yes
Norway	Yes	No	No	No	No
Oman	No	No	Yes	Yes	Yes
Pakistan	No	No	Yes	No	Yes
Palau	No	No	No	No	No
Palestinian Territory	Yes	No	Yes	Yes	Yes
Panama	Yes	No	Yes	Yes	No
Papua New Guinea	Yes	No	No	No	No
Paraguay	Yes	No	Yes	Yes	No
Peru	Yes	No	No	Yes	Yes
Philippines	Yes	No	Yes	No	No

Cuba	Yes	No	Yes	No	Yes
Curaçao	No	No	No	No	No
Cyprus	Yes	No	No	No	No
Czechia	No	No	No	No	No
Denmark	Yes	No	No	No	No
Djibouti	Yes	No	Yes	No	Yes
Dominica	Yes	No	Yes	No	No
Dominican Republic	Yes	No	Yes	No	Yes
Ecuador	Yes	No	Yes	No	No
Egypt	Yes	No	Yes	No	No
El Salvador	Yes	No	Yes	No	No
Equatorial Guinea	No	No	No	No	Yes
Eritrea	No	No	No	No	No
Estonia	No	No	No	No	No
Eswatini	No	No	No	No	No
Ethiopia	No	No	Yes	No	No
Faroe Islands	No	No	No	No	No
Fiji	Yes	No	No	No	Yes
Finland	Yes	No	Yes	No	No
France	Yes	No	No	No	Yes
French Guiana	No	No	No	No	No
French Polynesia	No	No	No	No	No
Gabon	Yes	No	No	No	No
Gambia	No	No	No	No	Yes
Georgia	Yes	No	Yes	No	Yes
Germany	No	No	Yes	No	No

Poland	Yes	No	No	No	No
Portugal	Yes	No	No	No	Yes
Puerto Rico	Yes	No	No	No	Yes
Qatar	Yes	No	No	Yes	Yes
Republic of Korea	Yes	No	Yes	No	Yes
Romania	Yes	No	Yes	Yes	Yes
Russian Federation	Yes	No	Yes	Yes	Yes
Rwanda	Yes	No	No	Yes	Yes
Saint Kitts and Nevis	Yes	No	Yes	Yes	No
Saint Lucia	No	No	No	No	No
Saint Vincent and the Grenadines	No	No	No	No	No
Samoa	Yes	No	No	Yes	Yes
San Marino	Yes	No	No	Yes	No
Saudi Arabia	Yes	Yes	Yes	Yes	Yes
Senegal	Yes	No	Yes	No	Yes
Serbia	Yes	No	No	Yes	Yes
Seychelles	Yes	No	No	No	Yes
Sierra Leone	No	No	No	No	No
Singapore	Yes	No	No	Yes	No
Sint Marteen	No	No	No	No	No
Slovakia	No	No	No	No	No
Slovenia	No	No	No	No	No
Solomon Islands	No	No	No	No	No
Somalia	No	No	No	No	No
South Africa	Yes	No	Yes	No	Yes
South Sudan	No	No	No	No	Yes

Ghana	No	No	No	No	Yes
Gibraltar	Yes	No	No	No	No
Greece	No	No	Yes	No	Yes
Greenland	No	No	No	No	No
Grenada	Yes	No	No	No	No
Guadeloupe	Yes	No	No	No	No
Guam	Yes	No	No	No	No
Guatemala	Yes	No	Yes	No	No
Guinea	Yes	Yes	No	No	Yes
Guinea-Bissau	No	No	No	No	No
Guyana	No	No	Yes	No	Yes
Haiti	No	No	Yes	No	Yes
Honduras	Yes	No	Yes	No	No
Hong Kong (SAR)	No	No	No	No	No
Hungary	No	No	Yes	No	No
Iceland	No	No	No	No	No
India	No	No	No	No	Yes
Indonesia	Yes	No	No	No	No
Iran	No	No	No	No	Yes
Iraq	No	No	No	Yes	No
Ireland	No	No	Yes	No	No
Israel	Yes	No	No	No	No
Italy	Yes	No	No	No	No
Jamaica	No	No	Yes	No	No
Japan	Yes	No	No	No	No
Jordan	Yes	No	Yes	No	No
Kazakhstan	Yes	No	No	No	No

Spain	Yes	No	Yes	No	Yes
Sri Lanka	Yes	No	No	No	Yes
São Tomé and Príncipe	No	No	No	No	No
Sudan	No	No	No	No	No
Surinam	No	No	No	No	No
Sweden	No	No	Yes	No	No
Switzerland	No	No	Yes	No	No
Syria	Yes	No	No	Yes	Yes
Tajikistan	No	No	No	No	No
Thailand	Yes	No	No	Yes	Yes
Timor-Leste	No	No	No	No	No
Togo	No	No	No	No	Yes
Tokelau	No	No	No	No	No
Tonga	No	No	No	No	No
Trinidad and Tobago	Yes	No	Yes	No	No
Tunisia	No	No	Yes	No	No
Turkey	No	No	Yes	No	Yes
Turkmenistan	No	No	No	No	No
Tuvalu	No	No	No	No	No
Uganda	Yes	No	No	No	Yes
Ukraine	Yes	No	No	Yes	Yes
United Arab Emirates	Yes	No	Yes	Yes	No
United Kingdom	Yes	No	Yes	No	No
United Republic of Tanzania	No	No	No	No	No
United States of America	No	No	Yes	No	No
Uruguay	Yes	No	No	No	No
Uzbekistan	No	No	No	No	No

Kenya	Yes	No	Yes	Yes	Yes
Kiribati	No	No	Yes	No	No
Kuwait	Yes	No	No	Yes	No
Kyrgyzstan	Yes	No	Yes	No	No
Lao PDR	No	No	No	No	No

Venezuela	No	No	No	No	Yes
Viet Nam	No	No	No	No	Yes
Yemen	No	No	No	Yes	No
Zambia	Yes	No	No	No	Yes
Zimbabwe	Yes	No	No	No	No

Study Coordinators

National eLearning Center

https://nelc.gov.sa/

About NELC

The National e-Learning Center was established as an independent entity by the Council of Ministers of Saudi Arabia, aims to enhancing trust in the eLearning programs, Leading innovation in Learning digital transformation and enabling the integration among educational institutions and labor market needs.

Online Learning Consortium

https://onlinelearningconsortium.org/

About OLC

Established in 1999 by the Sloan Foundation, the Online Learning Consortium is a collaborative community of higher education leaders and innovators, dedicated to advancing quality digital teaching and learning experiences designed to reach and engage the modern learner - anyone, anytime, anyplace.

Contributors

Jennifer Mathes, Ph.D.
Chief Executive Officer and Executive Director, Online Learning Consortium

Angela Gunder
Chief Academic Officer and Vice President of Learning, Online Learning Consortium

Alexander Case
Associate Vice President of Strategic Partnerships and Grants, Online Learning Consortium

Benjamin Scragg, Ed.D.
Director of Strategic Partnerships and Grants, Online Learning Consortium
(at the time of report writing, Director of Design Initiatives, Arizona State University Mary Lou Fulton Teachers College)

Tanya Joosten, Ph.D.
Senior Scientist, the Director of Digital Learning Research and Development, and co-Director of the National Research Center for Distance Education and Technological Advancements (DETA), University of Wisconsin-Milwaukee

Clark Shah-Nelson, D.B.A.
Assistant Dean, Instructional Design and Technology · University of Maryland School

Susan Picard
Coordinator of Technology Development, Northern Virginia Community College

ONLINE LEARNING™ CONSORTIUM

617.716.1414

grants@onlinelearning-c.org

Physical Address
6 Liberty Square #2309, Boston, MA, USA 02109