Trends and Issues of Digital Learning in Israel

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Abstract

This chapter explores the trends and issues of digital learning in Israel, with a focus on the challenges faced by educators in adapting education systems to the digital age. The authors, Prof. Orit Avidov-Ungar and Oded Busharian, discuss the importance of digital leadership in promoting the effective integration of technology into teaching, and highlight the significance of institutional norms and environmental conditions in this process. They also examine the impact of the COVID-19 pandemic on distance learning in Israel, and the need for a systematic transformation of teachers' understanding of education, student evaluation processes, digital infrastructure, and more. Ungar and Busharian suggest that Israel has a strong foundation for digital transformation in education. Israel's MOE, together with the academic community and some strong and innovative private and third sector actors, have invested heavily in bringing this change about. However, there are still some major obstacles to be overcome: the reliance on existing educational practices by many teachers; the cultural and ideological divide between different sectors in Israeli society; the fact that many teachers still do not see how digital technology can help transform their discipline; and the centralized nature of Israeli education and the reliance on high stakes standardized testing.

Keywords: digital learning, distance learning, educational technology, digital transformation, Israeli education

Theoretical Introduction

Adapting education systems to the digital age is a huge challenge for educators, both technologically and in terms of optimal integration in teaching (Tondeur, 2018). This type of process requires attention to the perceptions of educators regarding the integration of technology, its usefulness in teaching, its user-friendliness, and their sense of self-efficacy in its use. It also requires attention to the institutional norms and environmental conditions that promote its integration into teaching (Tondeur et al., 2019). The effective adoption of digital learning in education systems requires the development of digital leadership, particularly in light of the insights from the period for emergency remote online learning during the COVID-19 pandemic (Traxler, 2023). Fullan and colleagues (2020) discussed the integration of digital learning through three stages of change: (1) adapting to the disruption, (2) navigating towards a return to routine accompanied by uncertainty, and (3) creating an educational vision and designing new educational models based on the insights of the time.

The new reality of the digital revolution creates opportunities for innovative learning that presents the education system and teachers with new challenges (Avidov-Ungar & Amir, 2018; Collins & Halverson, 2018). Thus, education systems in Israel and elsewhere strive to incorporate innovation into teaching, to adopt digital learning as a routine part of teaching and learning, and to bring about a change in the school environment in order to equip students with skills and tools suitable for the 21st century (Mioduser et al., 2003; Nurmalisa et al., 2023).

Implementation of digital learning

For over two decades, education systems worldwide have been intensively engaged in attempts to introduce and integrate innovative technologies into

schools to promote digital learning in the educational space. The desire for innovation and the use of technologies in education stems from two motives, namely the pressure from parents and policy makers to improve and innovate, building on the belief that learning and teaching can be improved through digital learning, and the recognition of the role of the education system in equipping students with the skills they need to be ready for the competitive globalized economy (Avidov-Ungar, 2010, 2018; Cuban et al., 2001; Davies & West, 2014; Hayak & Avidov-Ungar, 2023).

The international organization, International Society for Technology in Education (ISTE), proposes operative indicators for teachers and digital leaders. The indicators reflect the power of technology to create a transformative revolution in teaching and learning, to accelerate innovation and to be used to solve complex problems. Five elements can be found in the list of indicators: (1) the use of technology to increase equality, inclusion and digital citizenship; (2) motivating colleagues to create a vision, strategic plan and ongoing evaluation for the transformation of digital pedagogy; (3) creating a culture that encourages innovative use of technology; (4) building teams for continuous integration of technology to support learning; and (5) the function of the leaders as role models (Crompton, 2017).

Models for implementing innovation in teaching

Several theories and models explain the assimilation of innovation in teaching, including that of digital learning. Some of these emphasize the adoption of the innovation from the perspective of the individual (Luo & Wee, 2021; Rogers, 2003; Sherry et al., 2000); others are based on the decision-making and its influence on the degree of integration of technology in teaching (Davis, 1989; Fishbein & Ajzen, 1975).

For example, Rogers' (2003) innovation diffusion theory presents a series of factors that influence the adoption or rejection of innovative technologies. The

model classifies five stages of innovation efforts: Innovators, Early Adopters, Early Majority, Late Majority, and Laggards. Sherry and colleagues (2000) expanded on Rogers' model and proposed five paths of adoption and integration of technology in teaching, where teachers undergo a cyclical process during which they develop from a learning teacher to a teacher leader.

Davis et al. (1989) developed the Technology Acceptance Model (TAM) based on the theory of calculated action (Fishbein & Ajzen, 1975). The model discusses the perceived benefit of incorporating new technologies (Davis et al., 1989). According to this model, two factors influence the degree of integration of the new technology when it is presented to users: the perceived ease of use, that is, the degree to which one believes that using a certain system will be free of physical and mental effort, and the degree of perceived usefulness, that is, the degree to which one believes that using a certain system will improve one's work.

The difficulties of implementing digital learning in education systems

Despite the clear need, the frequent opportunities, and the great potential inherent in learning and teaching technologies, the implementation of digital learning in education systems may encounter significant resistance and barriers and end in only partial implementation (Avidov-Ungar, 2010; IGI Global, 2023). While first-order barriers such as adequate technological infrastructure and the availability of devices are being resolved in most populations, second-order barriers such as digital literacy, pedagogical-technological knowledge, culture and perceptions of technology continue to be a challenge and even an obstacle (Blau & Shamir-Inbal, 2017; Ertmer & Ottenbreit-Leftwich, 2013; Paulus et al., 2020).

In an attempt to break down the barriers and overcome the challenges, and due to the high costs of assimilation and implementation, educational orga-

nizations often choose the "innovation islands" model. In this model, the innovation is implemented in limited areas of the organization with the aim of spreading from there, or through pilot programs which are supposed to teach everyone and allow for a smooth, slow, and controlled transition for innovation throughout the organization. In practice, these methods often allow only a partial application of technology, so that even technology-rich schools do not effectively integrate technology in teaching and learning (Avidov-Ungar, 2010; Davies & West, 2014).

Professional development of teachers to integrate digital learning

Intelligent use of current technological tools may improve teaching and learning and thus lead to more efficient and effective teachers' professional development (PD) (Tondeur et al., 2019). In Israel and elsewhere, in recent years, a variety of training courses, ideas, innovative tools and models have been integrated into the PD system. These enable the use of technological tools to implement digital learning in teaching and learning in schools (Avidov-Ungar et al., 2020).

One of the accepted frameworks for promoting PD and improving the assimilation of digital learning in schools is the Professional Learning Community (PLC). The purpose of such communities is to improve the expertise and professionalism of their members using communal social practices such as peer learning, supporting shared understandings and openness to change. Research shows that these practices enable the promotion of creativity and innovation of teachers within an open dialogue between colleagues. Beyond that, the PLC enables the assimilation of entrepreneurship and the dissemination of innovative teaching ideas and methods among teachers, including the integration of digital learning as part of the implementation of the challenges of the 21st century (Avidov-Ungar, 2018; Avidov-Ungar & Konkes Ben Zion, 2019; Fox et al., 2021; Liu et al., 2022).

The Status of Digital Learning in Israel's Education System

Education in Israel is mandatory between the ages of 6and 18. The system is divided into four main stages: pre-elementary, elementary, junior high school, and high school. Pre-elementary education in Israel is not compulsory, for children aged 3 to 5. About 537,000 children (about 20%), attend state pre-elementary education in Israel (Ministry of Education, 2022). Its main aim is to provide young children with the necessary social and emotional skills to prepare them for elementary education. Pre-elementary education is provided in nurseries, kindergartens, and day-care centers.

Elementary education (Grades 1 through 6) is compulsory for children aged 6 to 12. Almost half of Israel's students, about 1,120,000, attend state elementary education (Ministry of Education, 2022). Its main objective is to teach children the basic skills of reading, writing, and arithmetic, as well as to provide them with a broad knowledge of other subjects such as science, social studies, and the arts. Students in elementary education are taught mainly by a single teacher who also serves as a homeroom teacher, with the exception of specialized subjects such as music, mathematics, English and physical education.

Junior high school in Israel covers Grades 7-9 and focuses on building a strong foundation of general knowledge and skills, while high school (Grades 10-12), also mandatory, is more specialized and prepares students for university or advanced vocational training.

High school education provides students with the opportunity to study for matriculation examinations, which are required for admission to higher education institutions in Israel. The examinations cover a wide range of subjects, including Hebrew as first language, English, mathematics, history, and the sciences. At the start of high school education, most students choose one or two sub-

jects that they would like to study in greater depth as their majors.

Table 1 below shows the distribution of students across the various levels of education for the 2022 school year.

Table 1 Distribution of Students across Education Stream and Levels (in thousands) – Data for 2022

Pre-elementary	Elementary	Junior high	High school	Higher education
537	1,117	309	474	356

While the education system in Israel is relatively centralized, it is also divided geographically into education districts. There are eight districts: one for each of the three major cities in Israel (Tel-Aviv, Jerusalem, and Haifa); three geographic districts (northern, central and southern), one for rural education (the Hityashvuti district – in Hebrew: the rural settlements' district); and one for ultra-orthodox education (the Ultra-Orthodox district is relatively new and does not have geographic borders, but is instead cultural). These districts are responsible for implementing the MOE's policy, and for overseeing the learning activities in their respective regions.

In addition to the general system described above, Israel’s education system also has several unique components that reflect the country's diverse cultural and religious landscape. These include Arab education, religious education, and ultra-Orthodox education (see Table 1).

Arab education is the education system for Arab citizens of Israel, who make up about 20% of the population. About 558,000 students, or 22.7% of all students, study in Arab-state schools. Arab schools are taught in Arabic and follow the same curriculum as Jewish schools, with the addition of courses on Arabic as first language, Arab history and culture, and Islamic studies. Arab education faces several challenges, including a shortage of resources and in-

frastructure, low academic achievement rates, and a lack of integration with the Jewish education system.

Religious education in Israel is divided into two main streams: state religious education and independent religious education. State religious education is provided by the government and is designed for students who identify as Orthodox or religious Zionists. About 18.8% of Jewish students (15% of all students) study in the state-religious schools. The curriculum in these schools includes both secular and religious studies, with a focus on Jewish history, culture, and values. Independent religious education is provided by private religious institutions and is largely focused on Talmudic studies and religious law.

Ultra-Orthodox (otherwise known as Independent religious) education is a unique system of education that is provided to the Ultra-Orthodox Jewish community in Israel. Around 27% of Jewish students (22% of all students) study in the Ultra-Orthodox education system. This education system is largely self-contained and separate from the general education system, and it is focused on the study of religious texts and the development of a strong religious identity. Ultra-Orthodox schools are typically gender-segregated and have a low emphasis on secular studies, with a focus on religious education and Torah study. The figures of attendance in the various streams and levels of education within the Jewish sector are summarized in Table 2 below.

Table 2 Students in the Jewish Sector, Divided by Religious Affiliation

Education stream	Pre-elementary	Elementary	Post-elementary
Ultra-Orthodox	31%	31%	17.4%
Sate religious	21.6%	18.8%	18.2%
State general	47.4%	50.2%	64.4%

It should be noted that the description in the previous three paragraphs does not reflect the entirety of the complexity of Israeli society and its education

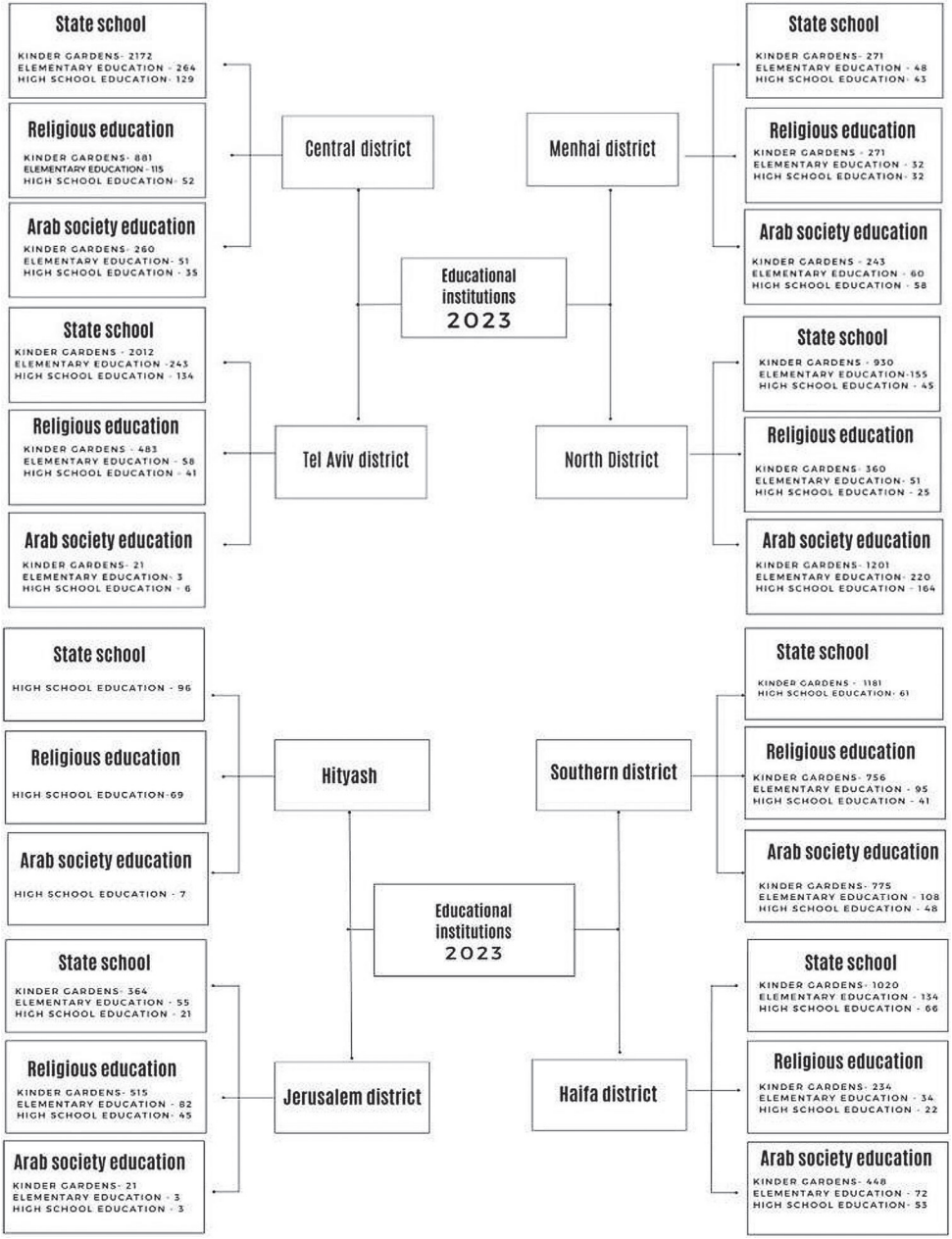
system. The Ultra-Orthodox community, for example, is further divided into Hasidic and non-Hasidic (or Lithuanian) Judaism, and the Hasidic sect is further subdivided into many different groups, each with its own educational creed and its own schools (Yeshivas). Arab-speaking society is also subdivided between Christians, Muslims, northern and southern Bedouin, and Druze.

Israel's education system faces several significant challenges. One of the most pressing is the achievement gap between different socioeconomic and ethnic groups. There is a significant disparity in educational outcomes between Jewish and Arab students, as well as between students from different socioeconomic backgrounds. Another major challenge is the cultural and ideological divide between the sectors. This divide makes it almost impossible to provide a coherent educational narrative, and even harder to have a narrative compatible with a modern liberal democratic society. This challenge also affects Israel's digital education status, as will be elaborated in the "challenges" section of this chapter.

In addition to formal and informal education programs, Israel has a strong system of higher education institutions. The country has several universities and colleges, including the world-renowned Hebrew University of Jerusalem and the Technion – Israel Institute of Technology. Israeli universities are known for their research and innovation in fields such as biotechnology, computer science, and engineering.

Here in Figure 1, you can see the structure of the Israeli education system.

Figure 1 The Structure of the Israeli Education System



The use of digital technology in Israeli schools: Education level (age) comparison

In Israel, the use of digital technology in education is more common and more advanced in later stages of education. In kindergartens, the use of digital technology is still in its infancy. While most kindergartens do have a working computer (90%) and an internet connection (60%) and use digital records of the children, at least some paperwork is still done by hand (Zilka, 2018). The use of digital technology for educational purposes per se is limited to the use of WhatsApp groups with parents to share photos and plan activities.

The main reason for the abovementioned state of affairs is the impression, shared by preschool education practitioners (as well as many parents) in Israel, that early exposure to digital technology is not necessarily something to be encouraged. A second (related) reason is that, setting aside theoretical concerns, children at those ages do have less use for digital technology than their older counterparts. For these two reasons, Israel's MOE limits the amount of time children can be exposed to the internet: up to 1 hour a day, no more than 3 days a week in kindergarten second grade, and up to 2 hours a day, no more than 4 days in a week in the third grade (MOE, 2013).

Now, as mentioned above, in elementary and junior high schools, the level of use of digital technology in education is mostly determined by the individual teacher and the principal. This means that about 80% of the uses of the technologies are limited to augmenting and enabling existing educational practices. Examples of such practices are in-class lectures using presentation formats such as PowerPoint or Google Slides, or out-of-class reading from digital books.

In high schools, two contradictory effects influence the adaptation of digital technology in education. On the one hand, at this age most Israeli students already have sufficient understanding of the English language, as well as some

level of digital literacy, to benefit from digital learning. On the other hand, at this educational level the pressures of high stakes standardized examinations are high, and this prevents the use of progressive educational practices in general, and the use of transformative educational technology in particular, as will be explained in the final section of this chapter. These two effects together create an environment in which digital technology is mostly used to support existing educational practices (digitalization) rather than to transform them (digital transformation).

The highest level of digital education in Israel can be found in higher education. In the wake of the COVID-19 pandemic, Israel's higher education sector has witnessed a shift in its approach to teaching and learning through the widespread adoption of digital tools and platforms. Israeli universities and colleges have successfully transitioned to online and blended learning models, effectively leveraging technology to ensure continuity and quality in education delivery.

By utilizing advanced digital platforms, such as virtual classrooms and online collaboration tools, institutions have successfully overcome geographical barriers and reached a larger audience of students, both within Israel and internationally. The availability of recorded lectures, interactive learning materials, and virtual simulations has empowered students to engage with course content at their own pace, enhancing their educational experience.

On this subject, it is worth mentioning the Open University in Israel. This academic institute aims to provide access to higher education to all students, regardless of place of residence or socio-economic status. Established in 1974, it has been offering distance education to a diverse student population since the late 1990s. With an enrollment of over 46,000 students, it represents a significant segment of the higher education landscape in the country. The institution's flexible learning model has been successful in attracting a diverse student body, with approximately 40% of its students being first-generation

tertiary education learners, and over 25% coming from underserved populations.

Digital learning in teacher education in Israel

The higher education system has to be involved in the integration of digital learning in teaching and learning. Although it takes time to assimilate the changes, a budget for this is guaranteed over time. It can be said that the State of Israel, through the Israel Innovation Authority, the Council for Higher Education, and the Ministry of Education (MOE), is promoting the assimilation of digital learning in higher education in general and in the academic institutions entrusted with teacher training in particular.

The Council for Higher Education issued a number of "requests for proposals" for the budgeting of academic institutions that wish to offer suggestions on how to promote digital learning in the teaching processes in academia. These requests for proposals allow the academic institutions to propose moves for the training of the academic staff in the universities to adopt digital learning, including the use of digital tools in teaching-learning processes. In addition, within the framework of the "requests for proposals" academic institutions may offer and develop courses such as MOOC courses that are based on asynchronous online learning. These courses enable collaboration between different academic institutions and also enable the exposure of content and lecturers to multiple students.

Also, specifically in the academic institutions that deal with teacher training, there is a program called "PRIZMA" (in the sense of “point of view”). In this program, every academic institution engaged in teacher training has the option of appointing an academic position holder, usually a faculty member, whose job it is to lead the implementation of pedagogical innovation among the academic teaching staff at the institution. This appointee’s role is to lead the adaptation of teaching that integrates digital learning among the students who are

the future teachers in the education system.

In the charter of the requests for proposal sent to academic teacher training colleges in Israel, the colleges may offer unique courses for the training of the faculty, the development of lesson plans based on digital learning, and more. In addition, using these budgets, the college may purchase digital learning tools that have an annual subscription cost, for use over time.

Contexts of digital learning

The main nationwide policy influencing digital education in Israel is "the National Digitization of Education program" or the national program to adapt the education system to the 21st century, which was launched by the MOE in 2010. The goals of the program were to close the (then) existing digital gap between Israel and other OECD countries in terms of digital education, to bring Israel education in line with international standards in this field, and to close the technological gap between Israel's schools and Israeli society.

The program was implemented gradually, along two vectors. First, geographically, it started with schools in the periphery (the north and south districts) and then continued toward the center of the country. Second, it began with elementary schools, continued to junior high and then to high schools.

In the first 10 years, the main effort of the program aimed to improve digital infrastructure in schools. This involved increasing the number of computers per class, improving ICT infrastructure, improving teacher understanding of the use of digital technology in education, increasing technical support available for teachers, improving access to digital learning materials, and appointing a designated coordinator for digital learning in schools.

Within the state and state-religious education systems and, to some extent, the state-Arab education, the quality and quantity of physical digital infrastructure has indeed been dramatically improved thanks to the program. Most teachers

in participating schools also reported in an evaluation survey that the schools had sufficient digital resources (Ratner et al., 2015). Later in this chapter we will discuss the sectors that did not manage to benefit as much from the program.

Over the last 5 years, the National Digitization of Education program has continued to operate, but has changed in a few ways. First – it is no longer optional, but mandatory for schools to "go digital." Second, the emphasis changed from physical digital infrastructure to managerial and pedagogic infrastructure. For instance, in the central education district there are 150 elementary schools (out of around 400) which participate in the computational thinking program.

Teachers in Israel have an option to participate in dedicated professional development programs dealing with digital transformation of education. In is estimated that around 40% of teachers choose to do so. However, in terms of teachers' (and principals') understanding of digital technology and the role it may have in transforming education, the program's success remains unclear. While most teachers and principals learned how to use technology to improve and augment existing educational practices, they did not (and do not) make full use of its potential.

An example of this problem can be seen in the PISA 2018 research, where, while 75% of principals reported that a platform to support digital online learning existed, only 25% reported that the teachers were encouraged and rewarded for implementing such learning, and most (55%) reported that the teachers did not have the necessary skills to do so. This will be elaborated in the final section (discussing issues and challenges to digital learning in Israel) of this chapter.

Another important part of the context of digital learning is the organizations that develop digital learning tools in the country. This is even more important

in Israel, since many of the available tools are in English and are not necessarily useful for Israeli students, at least not in primary schools. Fortunately, Israel is a "startup nation" and has a very prosperous high-tech sector. Consequently, it has quite a few educational technology developers.

Chief among those is the Center for Education Technology (CET). CET is a community interest company and is by far the largest developer and provider of educational technology in Israel. CET has been instrumental in developing online learning environments, enabling students to access educational content anytime and anywhere, thereby promoting inclusivity and bridging the digital divide.

CET also provides teachers with training, resources, and guidelines to effectively integrate technology into their classrooms. They strive to promote collaboration among educators, students, and parents through digital platforms. CET also conducts research and development to identify emerging technologies and innovative pedagogical approaches.

The status of digital learning in Israel

In this section, we will discuss the current implementation of digital learning in Israel's education system. In accordance with the terms defined by the book's editors, we will distinguish between digitization, digitalization, and digital transformation. Digitization will mean converting non-digital records and information into digital format and the enhanced uses of these data. Digitalization involves the conversion of processes or interactions in education into their digital equivalents. Digital Transformation will refer to uses that are innovative and fundamentally change educational processes, including making decisions to support the use of digital technologies.

Digitization: Digital student records have been in use in Israel for over two decades. Those records have revolutionized the way information is stored and managed in Israel's education system. Traditional paper-based records have

been gradually replaced with digital platforms and databases, allowing educators and administrators to access, update, and analyze student information more efficiently. These records encompass a wide range of data, including academic performance, attendance, behavior, and personal details.

Israel's education system also has a relatively strong digital information management system. School records for all K-12 stages are kept in the MOE database and can be used by policy planners in the MOE headquarters. Digital information management supports educational research and policy development. Large-scale data analysis allows policymakers and researchers to identify educational trends, evaluate the effectiveness of interventions, and inform evidence-based policy decisions. This data-driven approach contributes to continuous improvement and informed decision making in Israel's education system.

In addition to the information management systems provided by the MOE, Israeli school headmasters also undergo specific training and professional development in data-driven decision making. For example, in the central education district, all headmasters have day-long meetings with their superintendents and RAMA professionals in which they study the subject. The National Authority for Measurement and Evaluation in Education (RAMA) was established in order to help the education system in Israel to be the best in achieving the results it has defined for itself, and to allow Israeli students to possess knowledge, skills and values adapted to the challenges of the future. RAMA is an independent intra-governmental authority, which reports directly to the Minister of Education, in the status of an enhanced reference unit in the Ministry of Education. Since its establishment in 2005, the authority has been collecting, analyzing and distributing diverse, validated and professional data, designed to support decision-making processes and large-scale change processes. RAMA is the leading body and the professional guide of the education system in the fields of measurement and evaluation. The authority acts as a professional, objective and independent entity, serving all stakeholders in the

education system and beyond, including administrators, teachers, parents and student, who seek to build a better future for the State of Israel.

Digitalization: As mentioned above, digitalization is the use of digital technology to complement and improve existing educational practices. Within this scope lies a wide range of uses, including class management, e-learning, teleconferencing, digital blackboards and presentations, digital reading materials and more.

In Israel, the effort to integrate digital technology to improve and augment contemporary educational practices is still a work in progress. On the one hand, the MOE offers teachers and schools various avenues for such digitalization. On the other hand, actual implementation of digitalization in schools still depends on the knowledge and attitudes of individual principals or even individual teachers. Overall, while it is possible to assess that about half of Israeli schools and teachers implement some sort of digitalization in the classroom, a great deal of the potential of digital technology still has not yet been tapped into.

One type of digitalization that does see frequent use in Israel is learning management systems (LMS). Israel's MOE provides those working in education with access to various Moodle-based LMSs. These platforms provide a centralized hub for teachers to create and distribute digital resources, assign and grade tasks, and facilitate online discussions. LMS platforms promote blended learning, allowing students to access course materials and assignments remotely. They also encourage interactive and collaborative learning experiences through features such as virtual classrooms and discussion forums.

The shift from traditional textbooks to digital reading materials is a good example of the fact that although digital technology is implemented, it has not transformed educational practice as it might do in the future. On the one hand, digital textbooks, e-books, and online educational resources are available for

students and teachers both via the MOE, and on the internet. These resources provide students with up-to-date information and are easily accessible on various devices, reducing the burden of carrying heavy physical books. On the other hand, most of the existing digital learning materials are not far from a simple digital copy of existing physical books. Features such as internal and external hyperlinks, multi-media user experience, interactivity or adaptability do exist in some disciplines, but are not regularly used in classes. Various challenges that are impeding the use of more advanced features of digital learning materials will be discussed in the relevant section.

Other digital technologies and digital platforms are also being used to augment existing teaching practices. Quiz-generating programs such as Quizlet or Kahoot! are regularly being used in classes. However, the way they are most frequently used is as a game in which the teacher poses a question (or questions), and the students answer them. While this is a step up from other teaching techniques, these same apps could be used to allow for constructivist learning. For example, students might be asked to devise the questions (and answers) themselves.

Digital transformation: Digital technology has the potential to radically transform educational practices. It can be used as part of student-centric education, to allow students to work together, to construct their own understanding of the study material and to have agency over their own learning. In order for that to happen on a national scale, teachers, principals, and policymakers need to work together to create a systemic change in how the education system works.

In Israel, such transformation is still far from happening. While it is possible to see some teachers and even some schools changing how they think about and practice education, the large majority still use technology only to augment existing educational practices. Moreover, while the MOE does invest a lot of resources into promoting the use of digital technology for educational trans-

formation, some existing policies work in the opposite direction and make such transformation difficult to achieve.

Beginning with the COVID-19 period, the MOE (via the education districts) set out to change teachers' perceptions of digital learning. During dedicated professional development sessions, teachers learn up-to-date models of digital technology use in education such as the SAMR model (Blundell et al., 2022) or the TPACK model (Rodríguez Moreno et al., 2019). Again, data regarding the effects of the professional development are hard to come by, but the goal is to get 30-40% of teachers to understand and adopt new models of digital transformation (as "early adopters").

One example of a school that does make use of digital technology to transform its educational practices is "Alterman Tichonet" (named after Nathan Alterman - Israel's national poet) high-school in Tel-Aviv. This is a "paperless" school – all its learning and practice material are online. It uses technology to enable project-based leaning, problem-based learning, and collaborative learning. It has a robotics lab on campus and an R&D center.

The consequences of the COVID-19 pandemic for the implementation of digital learning

The COVID-19 pandemic accelerated digital learning in schools in Israel. The State of Israel succeeded in the transition to distance learning in a manner worthy of praise thanks to several measures that were carried out even before the outbreak of the pandemic. However, some of the advances made during the pandemic have been scaled back in the period since then.

Some of the advances made during the pandemic are: distance learning policy and procedure, establishment of a "cloud infrastructure" of learning materials for all educational institutions, leadership of officials with an emphasis on ICT coordinators who managed the distance learning in schools, systematic and orderly professional development for ICT teachers and a variety of fields of

knowledge that integrate digital literacy, and an annual practice anchored in a mandatory CEO's circular of distance learning in all schools.

An example of technology that was accelerated during COVID-19 but is currently underutilized in the Israeli education system is teleconferences for the purpose of blended or distance learning. In Israel, like in other countries, the pandemic accelerated the adoption of teleconferencing tools in education. Platforms such as Zoom, Microsoft Teams, and Google Meet were widely utilized to conduct virtual classes. Those platforms enabled real-time interaction between students and teachers. Remote learning thus overcame geographical barriers, allowing students to access quality education from anywhere in the country.

However, since the end of the pandemic and the curfews imposed to prevent its spread, the mandate for schools to perform distance learning has ended as well. Today, the use of teleconferencing in education is limited mostly to some parts of higher education and a few private or experimental schools (which will be discussed in the following section).

It should be noted, however, that efforts are being made, at the educational district level, to preserve the advances made during COVID-19. For example, the central education district has a few days a year when schools go back to distance online learning (as an exercise). This is considered first to be a part of the skills needed for future workers, and second, part of Israel's preparedness for future possible crises.

During COVID-19, the use of digital cloud environments to share documents and store the "organizational memory" of schools, as well as the use of virtual environments such as "Google Classrooms" became very common. It is estimated that around 80-90% of schools used such digital tools effectively. And again – this statistic dropped drastically post COVID-19, and it is estimated to be around 40-50% of schools now.

Another example of changes that were scaled back is the diverse range of digital content for all age groups, provided by the MOE to meet the needs of various sectors. This included digital books, models for distance learning, and an online broadcasting system that was established for learning core subjects, cloud environments and educational apps. In addition, the schools were required to change their perception of the methods of assessment to include alternative assessment, and high schools were also required to conduct online examinations. Although all those learning materials and environments remain post-COVID, their use is now miniscule compared to the pandemic period.

Some changes, however, have remained and continue to influence the use of digital technology. An example of this is the budgeting of computers and internet infrastructure, with an emphasis on access to libraries, for students who could not afford them before. During the pandemic, over half a billion NIS were invested in strengthening such physical digital infrastructure. That is, laptop computers and wireless internet access were provided to the students' homes mainly in peripheral areas, but also in the center of the country, where needed.

Throughout the duration of the pandemic, the teaching staff studied and developed professionally in a wide variety of courses to promote practices of synchronous and asynchronous learning. For example, all teachers participated in a series of mandatory district-based online training sessions for a large audience of teachers every day, twice a day. As another example, teachers were provided with a series of training sessions for the communities within a local authority.

While the knowledge and skills that the teachers acquired during those professional development sessions remains theirs, and still affect their usage of digital platforms to this day, the participation in these sessions decreased dramatically when COVID-19 ended. It is estimated that only around 40-50% of teachers take advantage of the opportunity nowadays.

The COVID-19 pandemic has highlighted the importance of digital literacy skills at both the teacher and student levels. As a result of the pandemic, digital learning has become an integral part of the education system in Israel, and it continues to develop with the aim of shaping the future of education.

Digital learning infrastructure

Digital learning in schools is very much dependent upon several components of digital learning infrastructure. One of those components is, of course, physical infrastructure, but other components, which are as important for effective use of digital learning, are the ability and knowledge of school leaders, the existence of accessible courses and other software components, the assessment of digital skills, and the professional development of the teachers. All of these components will be analyzed in the following section.

Leadership and budget: The ICT and Technology in Education Division within the Technological Education Administration in Israel's Ministry of Education leads the field of digital technologies in teaching and learning, and is responsible for writing policy, including in reference to protection and information security and for providing technological solutions for the schools, which includes budgets for equipment and internet infrastructure. Over the past few years, there have been calls to join the ICT program, which includes large budgets, and beginning with the 2016 fiscal year, schools receive budgets through a unique budgeting system (called GEFEN – the Hebrew acronym for "administrative pedagogical flexibility") that allows school administrators broad flexibility in choosing extra activities that are suited to the school's unique needs.

In addition to the special budgets routed toward digital infrastructure during the COVID-19 period and "National Digitization of Education program," the MOE has allowed in recent years for school leaders to select their own route to digital transformation. As part of the new "Gefen" (Hebrew acronym for

"Pedagogic-managerial flexibility"), principals receive a dedicated budget to spend on whatever digital technology they choose.

Another critical infrastructure for digital transformation of schools is the role of the techno-pedagogical or computation coordinator in schools. About 90% of schools in Israel have a teacher who takes this role. The coordinators are responsible for leading pedagogical and organizational transformation in school. They receive dedicated professional training, and additional pay for that goal.

Course design and delivery: Schools in Israel may teach through online courses on secure digital platforms and tools to create a learning sequence in routine and emergency situations. They use learning management systems (LMS) such as Moodle / Google Classroom / Microsoft Teams to enable relevant, meaningful, and adapted learning for each student.

Student success in digital learning: One of the goals of using virtual spaces is to provide learners with success-oriented experiences, thereby increasing their motivation to learn. To this end, the Ministry of Education in Israel makes educational websites available to schools such as the "Springboard" program that provides lessons and individual or group support for students to reduce gaps. There is also the "Bagroup" program to help small groups of high school students prepare for matriculation examinations and more. Schools teach lessons dealing with digital literacy as part of the curriculum in order to train learners to succeed while working on a variety of digital platforms.

Assessment and analysis: Evaluation of student performance and data analysis are carried out in schools in Israel via platforms that make digital content accessible. These also provide students with immediate feedback for the student as well as creating learning reports for the teacher. The LMSs map the students' achievements and allow the teacher to provide a tailored response to each student within each class. These digital tools make it possible to reach data-driven decisions that lead to improvement in student performance.

In addition, the MOE has recently begun implementing a digital testing format for the matriculation examinations in some disciplines. This format is meant to allow cost-effective non-standardized testing, and therefore to allow testing of deep learning and transferable 21st century skills and capabilities. Official data regarding the use of this option is not yet available, but it is estimated that by 2025, almost all tests in the humanistic learning fields will be taken digitally. This is expected to directly influence digital transformation in high schools, and indirectly encourage such transformation in lower grades as well.

Professional development of teachers and staff: The Ministry of Education in Israel invests in the professional development of the teaching staff through a variety of channels: courses at Pisgah centers (regional institutions for teacher PD throughout the education system), courses at schools (known as the Learning Staff Room), national online self-study courses, and group learning in professional learning communities that use hybrid (synchronous and asynchronous) formats. All courses are required to comply with a standard that requires the lecturer to have an accompanying online space that serves as a model for the teachers and ensures the integration of digital literacy into the training process.

Technological infrastructure: The Ministry of Education in Israel provides all schools with fiber optic internet bandwidth and connectivity to support online learning. In addition, the Ministry provides an information security mechanism that includes a password system with uniform identification for all students in the education system as well as for the teachers. The Ministry of Education provides laptops to students who cannot afford them, and encourages learning in the BYOD (Bring Your Own Device) model, in which students bring to school their own digital device such as a laptop or iPad for learning in school.

Features of digital learning

Strong foundation for the use of digital records: Israel's education system has a few important features when it comes to digital learning. First, it has a **strong foundation for the use of digital records to make decisions in education**. An important part of advancing this use of data was the establishment of the National Authority for Research and Evaluation in education (known by its Hebrew acronym - RAMA). The authority was formally established in 2006, following recommendations of a government-appointed Dovrat Committee. During the last 15 years, RAMA has undergone many organizational changes.

Today, RAMA is responsible for the ongoing evaluation of the education system as a whole. This includes, among other things, overseeing and managing the participation of the education system in international assessment projects, developing indicators and various measurement instruments to suit the system's needs, assisting schools with internal evaluations as well as conducting evaluations of national education programs.

RAMA also provides schools with tools for internal evaluation of their own strengths and weaknesses. These tools are suited to evaluate both the general goals of the national curricula and specific school goals. They include online adaptive tests and tasks for students, questionnaires for teachers and administrators, and a collection of "evaluation items" to discern students' understanding of core subjects. RAMA also informs interested school staff about the proper ways to use these evaluation tools and understand the data collected by them.

Advanced school data management: One notable feature of Israel's digital record-keeping and usage that has seen great development in the last decade is **school data management**. This came via the implementation of the MANBAS (an internet-based school management system). This system can be

accessed by school administrators from every internet-connected computer. The system has numerous applications that are gradually being added. At the teacher level, it allows its users to manage student evaluations, report on lesson progress, students' attendance and behavior. At the staff level, it manages the school timetable and the status of school staff, reports on unusual events (e.g., accidents), and school security, and can generate a wide variety of other reports and certificates. It is currently in a pilot phase of offering services for the students' parents as well.

Digital records are thus used to facilitate data-driven decision making in education. Educators can analyze student data collectively or at an individual level to identify trends, implement targeted interventions, and personalize instruction. This evidence-based approach enhances educational outcomes and supports the continuous improvement of teaching practices.

Lastly, the MOE also provides a way for the general public to access information regarding schools and school districts via transparency in the education system. This system includes indicators on school climate, dropout rates, teachers, and other school staff, learning in schools, academic achievements, and technology usage. These data are presented both in numerical format, and in easily understandable graphs. They can also be presented comparatively.

Strong connection between the MOE and the academic community: A third feature in this vein is a **relatively strong connection between the MOE and the academic research community**. Firstly, almost all educational data are made available for academic research via the MOE's online research room, where approved academics can access data about all aspects of Israel's education system collected in the last 15 years (at least). The data first undergo an anonymization process to ensure that individual privacy is maintained.

Another important connection comes from the Office of the Chief Scientist in the MOE; as the central hub for scientific research and innovation in the edu-

cation sector, it serves as a vital conduit for knowledge exchange and collaboration. Its primary purposes are to enable effective communication between researchers, scholars, and policymakers, ensuring that evidence-based findings and insights from academia inform the development and implementation of education policies. By fostering these connections, the Office of the Chief Scientist allows policymakers to make informed choices that are grounded in research.

Moreover, this Office also plays a pivotal role in channeling policy priorities and challenges to the academic community. It serves as a key platform for policymakers to communicate their needs, concerns, and aspirations to researchers, encouraging them to conduct targeted studies and investigations that address pressing issues in education. This cooperative approach enables policymakers to tap into the scholarly resources of the academic community, fostering a two-way flow of knowledge and expertise. By actively engaging with academics and researchers, the Chief Scientist's Office aims to ensure that policies are evidence-based, relevant, and aligned with the evolving needs of the education sector. In addition, since 2003, the Israeli Academy of Science and Humanities has had a large unit whose goal is to provide advice to the government in the field of education. This is done by bringing research-based knowledge to the attention of decision makers for use in deciding on policy and improving Israel's education system.

This unit, named "Yozma" (the Hebrew word for "initiative") has various channels of activity: expert committees which tackle complex challenges and fundamental issues of ongoing concern to the education system and in which many entities are involved; work groups consisting of both Ministry of Education managerial and field staff as well as expert scholars that are established to develop a specific product, brief research reviews aimed to support specific policy decisions, and more.

Trends and Issues in Digital Learning

Like most education systems worldwide, the Israeli education system is constantly evolving and changing. The changes are affected by the cultural, structural, and political environments of which the education system is a part. In this section, we will examine some of the major trends in digital learning in Israel in the past decade, as well as some of the issues and challenges facing the effort to digitally transform the Israeli education system.

Trends in digital learning

In the ever-changing landscape of education in Israel, some important changes have taken place in the past 10 – 15 years, and some are still in progress. The major ones, in the opinion of the authors of this chapter, are:

- **The improvement in physical digital infrastructure:** as mentioned above, since 2010, Israel's MOE has been conducting the National Digitization of Education program as part of its effort to adapt the education system to the 21st century. Thanks to this program, the physical digital infrastructure in schools in most sectors of the country has dramatically improved.

- **The building of a "pedagogical database" for digital transformation:** As mentioned previously, the main effort of the MOE in the second decade of the 21st century sought to improve the physical digital infrastructure for schools. Now, while this has not been achieved for all sectors, and is still an ongoing effort, the focus of the MOE's efforts has shifted. Today, the main effort is going into building a comprehensive online databank of digital tools, activities, and learning materials. This effort is led by the professional pedagogical unit of the MOE, and therefore deals more with pedagogical advancement than with technologies.

- **The move to digital data management and decision making:** During the first decade of the 21st century, Israel's education system has mostly completed the move to digital student records, digital management tools, and digital information management. However, in the past decade, further substantial advancement has been made. Israel's education system has made significant strides in digital information management, encompassing various areas such as curriculum planning, teachers' professional development, and educational research. This progress has enhanced administrative efficiency, promoted data-driven decision making, and improved overall educational outcomes.

- **Acceleration of digital use in teacher education:** In recent years, digital learning in teacher training has significantly accelerated as part of the assimilation of digital learning in higher education in general in Israel. Teacher educators have realized that digital learning must already be integrated into the academic learning processes of students in all fields, and even more so in the academic programs for teacher education. It is known that these processes take time, but the policy, prioritization and budgeting in this regard have put these issues on the agenda, thereby giving impetus to the integration of digital learning in Israeli academia. It can be said in this context that relatively speaking, in Israel's higher education system, the assimilation of digital learning is at a medium-to-high level and is getting better all the time. The issue is on the academic-pedagogical agenda and is constantly developing, and this is clearly reflected in the allocation of dedicated budgets for this purpose.

- **Gradual opening of the Jewish orthodox society to the digital world:** as we will see below, one of the major obstacles to digital learning in Israel is the fact that the Jewish ultra-orthodox sector is very closed off and abhors the use of digital technology. In the last few years, and especially since the COVID-19 pandemic, this may be starting to change. The pandemic, and the school closures that came with it, forced

many in this community to be exposed to digital technology. This process is still very much in its tentative stages and may still be reversed over time, but it definitely cannot be ignored.

Issues in digital learning

Conservative perceptions of the educational process: The main reason for the sluggish progress toward digital transformation is not actually (directly) related to knowledge or attitudes toward technology, but rather **to perceptions of the educational process as a whole**. Most teachers and headmasters in Israel still regard education as a process by which knowledge is transferred from the teacher to the students (OECD, 2019; Zohar & Busharian, 2020). Even when a theoretical understanding of current educational theory (e.g., constructivist or social constructivist theories) exists, it is difficult for teachers to rise above their imprinted methods of teaching – the ways in which they themselves were taught in school and how they have been teaching for many years.

Lack of understanding of the potential of digital education: In addition, even when teachers do understand the need to apply a student-centric design and student-centric learning, they do not always **understand the ways in which digital technology can help achieve this goal in their particular discipline**. In other words, they do not always have the pedagogical-content digital knowledge. It should be noted that Israeli teachers (like teachers in most countries) have a lot on their plates. The same can be said for Israeli principals. They do not usually have the time or the resources to invest in trying to figure out the current educational technologies and how to best use them in class. This means that even when the MOE or third sector NGOs make an effort to enable easy access to digital tools that may lead to digital transformation, the teachers sometimes do not have the time or resources to learn how to use them in a pedagogically optimal manner.

Now, as we mentioned, the MOE does invest considerable resources in providing easily accessible digital content of the type that might transform Israeli education. Nevertheless, some education policies still exist that are making such transformation (on a systemic scale, at least) difficult, if not impossible. First and foremost among such policies is Israel's high stakes evaluation framework.

High-stakes examinations: In Israel, by the end of 12th grade, every high-school student is expected to take a comprehensive set of matriculation examinations encompassing almost all disciplines (some mandatory and other elective majors). **These are very high-stakes examinations,** since their scores will determine if the students can continue to higher education, and in which colleges or university faculties they may enroll. Moreover, these scores are also part of the teachers' evaluation and may affect possible bonuses, and the average results for individual schools are published online. In other words, the results of these examinations are also high stakes for teachers and principals.

All of the above would not be such a problem if not for two facts: first – it is very hard to evaluate "deep learning" with standardized examinations, which are usually better at assessing surface level understanding of the content. Second – the examinations assess a huge amount of information. In order to teach such huge amounts of information (on a superficial level), teachers have to resort to "old school" methods of teaching, and therefore constructivist learning is often abandoned.

It should be noted that the MOE does allow alternative assessment options in certain disciplines for schools that have the knowledge and resources to implement them. These may include technology-based matriculation examinations and project-based evaluation. However, these options require major resources from the schools, including having a sufficient technological infrastructure and teachers' completion of a special professional development course. Although the use of alternative assessment tools is definitely a step toward digital trans-

formation, they are still very much the exception rather than the rule.

The incentive for digital education content creators: A second policy that makes digital transformation hard has to do with **the incentive that the MOE provides for digital education content creators**. Currently, every school receives a certain budget aimed at purchasing digital content. However, the content creators receive a fixed sum for every class level in every school that uses their content. Schools can, of course, choose to pay more for the content from their own budget, but the MOE only pays a fixed sum. The result of this policy is that content creators have less incentive to invest in quality content (beyond a certain point). Since they cannot ask for a higher price, they sometimes cannot afford to do so.

The fractured nature of Israeli society: Another major obstacle for digital transformation of education in Israel comes from **the fractured nature of Israeli society as a whole**, and Israel's education system in particular. As a result, two sectors of the education system lag behind mainstream education in terms of digitization, digitalization and digital transformation. Those sectors are the Bedouin clans in the south of the country and Jewish Ultra-Orthodox communities. Both of these sections are roughly 10-15 years behind in terms of digitization, each for its own unique reasons.

For the Jewish Ultra-Orthodox communities, the main issue with digitization is **ideological**. This society is based on two principles: isolationism and ultra-conservatism. This means, first, that any unsupervised exposure to the outside world is considered suspicious, and second, that any new technology is met with resistance. Digital technologies and ICT in particular have both unwanted qualities – they are new, and they facilitate uncensored communication with the "outside" world. Thus, they are rejected by the adults and excluded from the education of the youth.

That being said, two things should be noted. First, despite appearances, this

society is not a single bloc - it has many sub-groups. These groups, while connected by the idea of strictly adhering to the ancient Jewish laws – the "halacha" – have varying attitudes toward Israeli society as a whole, and varying levels of antipathy toward any kind of technology.

Second, as mentioned above, the entire ultra-orthodox community in Israel has been undergoing major shifts in the last few years. They are becoming a larger percentage of the Israeli population. This growth forces them to play a larger role in the public sphere, and even shape that sphere – both roles they were very reluctant to play in the past. It is too soon to tell how these changes will affect their society in Israel (and Israeli society as a whole), but it is already clear that this effect will be dramatic, and that it will change the way most members of the ultra-orthodox community deal with digital technology.

Lack of infrastructure: There are two main reasons for the lack of digital use in education in the southern Bedouin population. The first reason is **infrastructure, or lack thereof**. About one-third of the Bedouin population in the south resides in unrecognized illegal settlements which largely do not have access to proper educational infrastructure (such as adequate classrooms) and definitely not adequate ICU infrastructure. But even for the other two-thirds who live in legal and recognized settlements, there is a big gap in education funding both at the local and the national levels. Therefore, the ICU infrastructure for them, while more readily available than in the unrecognized settlements, is still sorely lacking.

The second roadblock in the use of digital technology for educational purposes within the southern Bedouin society is **cultural**. Bedouin society has a very tribal and conservative culture. This culture clashes with modern forms of education management and makes it harder to place competent administrators and principals in schools. This, in turn, affects many aspects of education, including the use of digital technology.

Regarding the direction in which the use of digital technology in the Bedouin schools is heading, it is possible to identify two contrasting trends. On the one hand, the MOE is implementing a 5-year plan to improve and equalize the state of educational infrastructure in the Israeli-Arab sector, including, of course, the Bedouin sector. As part of this plan, every local authority belonging to that sector is expected to present its needs, and funds will be diverted to meet those needs. This means there is at least hope that the digital infrastructure for that sector will improve in the near future.

However, when it comes to the cultural elements of Bedouin society, the road ahead is not as clear. The ongoing Israeli-Arab conflict, trends of Islamist radicalization and increased connection to the Palestinian population, all contribute to the continuing cultural gaps between the Bedouin and general Israeli society. On the other hand, both third sector NPOs and the Israeli government are investing billions of shekels in an effort to modernize and integrate the Bedouin population into Israeli society.

One relevant characteristic that the Jewish Ultra-Orthodox and southern Bedouins have in common is a **genuine distrust and suspicion of the government as a whole, and specifically the MOE**. Without getting into the historical and institutional reasons for that distrust, this is another reason why many of the efforts to integrate digital technology (on all three levels) into schools are met with resistance.

Conclusion

In conclusion, Israel's education system has been undergoing major changes in terms of the use of digital technology in education. Currently, most schools and teachers are using digital technology to improve and augment contempo-

rary educational practices. At the national level, Israel has a strong connection between the MOE and the research community, and a robust foundation for data-driven decision making.

On the other hand, while the Ministry of Education offers teachers and schools various avenues for digital transformation, the actual implementation of digital technology to transform education in schools still depends on the knowledge and attitudes of individual principals or even individual teachers. About half of Israeli schools and teachers implement some sort of digitalization in the classroom, but much of the potential of digital technology has still not been tapped into.

In the last 15 years, a few important positive changes have occurred in Israel's digital education landscape. First, there has been a massive improvement in physical digital infrastructure. The Israeli MOE has been actively working to improve the digital infrastructure in schools since 2010. Second, we have seen an increased use of digital technology in later stages of education and especially in teacher education. Third, there is an ever-greater usage of digital data management and decision making. Fourth, a massive undertaking, led by the professional-pedagogical units of the MOE, of building a "pedagogical database" for digital transformation with activities, lesson plans, apps and more is underway.

Unfortunately, Israel still faces some major social, structural, cultural and pedagogical challenges in its effort to allow digital technology to actually transform education. The cultural and ideological divide between different sectors in Israeli society makes it difficult to provide a coherent educational narrative that is compatible with a modern liberal democratic society. This challenge affects the development of a unified and inclusive education system. This divide is especially seen when it comes to the southern Bedouin sector, and the Jewish Ultra-Orthodox sector, both of which lag far behind in the use of technology in general, and digital technology in education in particular.

A second issue is that many teachers and principals have not yet fully understood modern educational theory, and the educational needs of 21st century children. This is a problem mainly because the actual implementation of digital transformation in schools still relies on the specific teacher in class or on the school principal. This relates to a third challenge – the fact that many teachers still do not see how digital technology can help transform their classroom practices in their discipline.

A fourth issue preventing digital transformation in Israel comes from established educational policies. First, the reliance on high stakes standardized testing makes it hard for teachers and parents to think in terms of advanced learning theories – and it is therefore very hard to make the transition to it, with or without digital technology. Secondly, the highly centralized nature of Israel's national education system makes it hard (and unprofitable) for content creators to create high-quality innovative educational content.

In summation, Israel, at least in the national secular and national religious sectors, has a strong foundation for digital transformation. It is possible that in the near future, we will see more and more schools undergoing such transitions. However, this still requires some major systemic shifts in Israel's educational policies and culture. It remains to be seen whether such changes will actually be made.

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