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The Learning Environment in Secondary Schools as the Infrastructure for Providing 21st Century Skills

Abstract

The Learning Environment in Secondary Schools as the Infrastructure for Providing 21st Century Skills

Background

A learning environment is a physical space that enables different types of teaching; it combines up-to-date learning technologies and encourages student involvement. Numerous studies around the world show that an in-depth, long-term pedagogical change in schools requires a change in their environment as well. Therefore, changing the education system to adapt it to the 21st century and enabling schools to provide students with the skills they need, involve changing the physical and technological learning environment.

Redesigning of the learning space is one of the main challenges the modern education system faces these days. Recognizing the importance of adapting these spaces to innovative learning, the Ministry of Education's (MOE) five-year plan includes the objective of adapting the learning environment - including both the physical and ICT (Information and Communications Technology) infrastructures - to meaningful learning.

This report presents the situation as of the beginning of 2020, before the COVID-19 pandemic outbreak. Towards the completion of the audit and due to the pandemic, the MOE formulated a procurement program to narrow IT gaps in schools and to improve the digital infrastructures for remote learning.

Key facts

2,265

Number of secondary schools in Israel (including schools also for children of elementary-school ages)[1].

23%

Percentage of secondary schools included in the MOE's ICT program[2] at the end of 2018 (the program implements new IT infrastructures into schools and upgrades old ones).

48%

Percentage of secondary schools that have one computer per more than 10 students[3] at the end of 2018.

50%

Percentage of secondary school principals[4] who believe that the digital learning environment in schools supports the provision of the required skills to a medium or low extent (as of 2019).

52% and 62%

Percentage of secondary school principals[5] who believe that the physical environment in the schools they manage (does not contribute to providing 21st century skills (52% of them believe this is the case with laboratories, and 62% believe this is the case regarding the school's buildings, classrooms, and innovative spaces).

1.5%

Of the new secondary schools that the MOE recognized the need to establish in the period 2016-2018 were established under the Innovative Education Institutions project (20 out of 1,291 schools).

1.5%

Percentage of classrooms out of the total classrooms in secondary schools that were upgraded for innovative learning (M21 project) between the years 2016-2019 (496 out of 32,756 secondary school classrooms existing in the 2017/2018 academic year).

1%

Rate of schoolyards in secondary schools that were upgraded for outdoor learning (under the Outdoor Learning project) between the years 2016-2019 (19 out of 2,265 schoolyards).

Audit actions

From January 2019 until March 2020, the State Comptroller examined the preparedness of the Ministry of Education to adapt the Israeli education system for the 21st century, and to provide students with the required skills in the changing labor market. The audit focused on lower secondary schools and upper secondary schools, examining, inter alia, whether the MOE encourages secondary schools to create a technological and physical environment that supports the teaching of the 21st century skills to students, and whether it provides them with relevant tools for this purpose.

1 Data from the "Education Institutions Search System", November 2019, processed by the State Comptroller.
2 Lower secondary schools, upper secondary schools and six-year schools; data from the IT Administration as of the end of 2018, processed by the State Comptroller.
3 See Footnote 2.
4 Out of 757 principals who answered the questionnaire distributed by the audit team (respondents constitute 39% of all secondary school principals in Israel).
5 See Footnote 4.

The audit was conducted in the main units of the MOE and in secondary schools across Israel. It included an extensive public participation process, with head supervisors and focus groups of subject coordinators, and of students of 11 secondary schools. In addition, a questionnaire was distributed to 1,961 secondary school principals; 757 principals responded (39% of all principals)[6].

Key findings

- **Implementation of the ICT program in high schools** – the ICT program that the MOE is operating in recent years focuses on the implementation of new IT infrastructures in schools and on upgrading old ones. The program operates primarily in elementary-primary schools, and in only 23% of secondary schools. The data refers to the period before the implementation of the procurement program due to the COVID-19 pandemic.
- **Implementation of the ICT program in lower socio-economic clusters**[7] – 25% of secondary schools in the higher socio-economic clusters (7-9) participate in the program, whereas only 16% of secondary schools in the lower clusters (1-3) - that need this program - participate in it. The data refers to the period prior to the implementation of the procurement program due to the COVID-19 pandemic.
- **Implementation of the ICT program in ultra-orthodox schools** – schools in the State-Jewish education sector represent almost 50% of the schools that participate in the ICT program (whereas their percentage among all schools is 34%). Ultra-Orthodox schools comprise only 1% of all schools that participate in the program (whereas their percentage out of all schools is 30%).
- **Ratio of students per computer in secondary schools** – the MOE did not establish a standard for a reasonable ratio of students to the number of computers in schools. 48% of secondary schools have one computer per more than 10 students, and 23% have one per more than 20 students. Moreover, in higher clusters, 10% of secondary schools have a ratio of 20 students per computer, whereas this ratio is found in 40% of schools in the lower clusters. In State-Jewish education, 14% of secondary schools have a ratio of more than 20 students per computer, while this ratio is found in 50% of schools in the Arab education sector. The data refers to the period before the implementation of the procurement program due to the COVID-19 pandemic.
- **Ratio of teachers per computer in secondary schools** – the rate of availability of computers to secondary school teachers is low. In 40% of secondary schools, there is one computer per more than five teachers; in the lower clusters, this is the

6 The questionnaire enables to draw conclusions with a certainly of 95% and a sample error of ±2.8%.
7 The Central Bureau of Statistics ranks and groups settlements in Israel to clusters, based on their socio-economic status - from cluster 1 - weakest settlements, to cluster 10 - strongest settlements.

ratio in 52% of schools. The data refers to the period before the implementation of the procurement program due to the COVID-19 pandemic.

- **Upgrading the physical environment in secondary schools** – the percentage of secondary schools that participate in the MOE's project for improving the physical environment in schools in order to adapt it to the 21st century is very low. Between the years 2016-2019, as part of the M21 project for classroom improvements, the MOE approved the renovation of only 496 secondary schools, which represent 1.5% of all 32,756 classrooms in Israel and 33% of all requests received. As part of the Outdoor Learning program the MOE approved the construction of 19 schoolyards in secondary schools, which constitute 1% of all 2,265 secondary schools in Israel and 17% of all requests submitted.

- **Accompanying research for projects to improve the learning environment** – the MOE did not perform accompanying research to support the projects. Moreover, there was no monitoring of the quality of the new schools built, the renovated M21 classrooms, the new learning schoolyards, and how these spaces contribute to innovative learning adapted to the 21st century. The Ministry also failed to assess the level of satisfaction of the actors in the field, and the disadvantages and barriers of these projects.

Active actions to improve the physical learning environment in schools – the MOE has been executing projects for improving the physical learning environment in schools since 2016. These projects include innovative educational institutions, M21 classrooms, and learning schoolyards, although the scope of these projects is limited.

Procurement program during the COVID-19 pandemic – in its response of October 2020 to the audit's findings, the MOE indicated that it had formulated a procurement program during the COVID-19 crisis, allocating to it a budget of 1.2 billion NIS. The aim of the program was to narrow the ICT gaps in schools and establish a digital infrastructure for remote learning.

Key recommendations

- **Including all schools in the ICT program** – it is recommended that the MOE complete the required procurement so that the schools obtain the technological and digital tools they need, by including all schools to the ICT program. The program should focus on schools in the lower socio-economic clusters in order to give them essential tools to develop technological and digital skills among their students. Furthermore, in light of the COVID-19 crisis that reinforces the importance of a comprehensive and quality technological and digital infrastructure as the foundation for remote learning, it is recommended that the MOE use the budget already allocated to implement a comprehensive plan for remote learning during the Covid-19 pandemic. The plan should include all schools into the ICT program, and the Ministry should make efforts to reduce the shortage of laptops for students at home.

- **Define appropriate ratios for students per computer and teachers per computer and strive to achieve them** – it is recommended that the MOE define appropriate students to computer ratios taking into consideration the computing equipment available to schools (tablets, laptops, etc.), and completes the mapping of students' needs through a nationwide survey of available ICT infrastructures. Thereafter, it is recommended to update the data routinely so that it will be possible to continuously monitor the situation regarding this issue. It is also recommended that the MOE act within the current and future procurement plans to improve the students-to-computer ratio in schools in the lower socio-economic clusters and in Non-Jewish schools, in order to ensure adequate access to computers for every student in every school.

- **Adapt technological and digital infrastructures to provide students with the skills they require** – it is recommended that the MOE complete the upgrade of the technological and digital infrastructures in schools, including internet infrastructure, in order to impart technological and digital literacy to students. The COVID-19 pandemic and its repercussions on the education system indicates the importance of using the internet and the digital skills students require to use it effectively; and it is appropriate to develop the capabilities already developed in this time of crisis. Therefore, it is recommended that the MOE continue to monitor and ensure that the use of the internet and of digital skills continue to be effective, while adding the training and technical support required.

- **Formulate a comprehensive plan of projects for improving the physical learning environment, including studies that support these projects** – it is recommended that the MOE formulate long-term plans for projects of innovative educational institutions, M21 classrooms, and schoolyards. It is also recommended that the Ministry improve the data available for these three important projects, supporting them with accompanying research for improvement and effectiveness. The MOE should also evaluate the possibility of increasing the number of secondary schools that participate in these projects, giving priority to schools in lower socio-economic clusters and in non-Jewish settlements where the scope of innovative construction is low.

differences between classrooms in the Gymnasia Herzliya Hebrew high school in Tel Aviv in -1912 and today, and an innovative M21 classroom, Ort Bistritzky, Ramla.

Source: 1912 classroom from High School, Wikipedia; today's picture from the class4u website for classroom rentals; picture of the M21 classroom from the MOE repository. .

Summary

To prepare secondary school graduates for future success, and in light of the global engagement in this area, the education system must provide students with the skills they will need as adults in their social, personal, and professional lives in the 21st century.

The audit's findings show that on the eve of the COVID-19 crisis at the beginning of 2020, the physical, technological and IT environment of schools in general and secondary schools in particular did not provide optimum conditions for the effective acquisition of the skills of the 21st century in general, and technological and digital literacy in particular. The availability of IT learning resources to both students and teachers was low. The changes made to the physical environment in secondary schools were not sufficient to enable optimum innovative learning.

The COVID-19 pandemic further emphasized the importance of a comprehensive quality technological and digital infrastructure in schools. Such infrastructure should provide the essential foundation for remote learning. In this regard, the procurement plan the MOE prepared for the pandemic (as indicated in its complementary response of October 2020), to bridge ICT gaps and promote a digital infrastructure for remote learning, is noteworthy.

It is recommended that the Ministry of Education utilize the budget allocated to it to implement a comprehensive program for remote learning and continue to act to improve the physical and technological learning environment. The Ministry should also expand the number of schools that benefit from an innovative and effective learning environment and technological devices, and encourage schools (mostly secondary schools) to participate in projects that promote such environments. At the same time, it should work to remove barriers and take into consideration the gaps in schools of a lower socio-economic level, and in the ultra-Orthodox and Non-Jewish sectors.