- Working Paper for Consultation -

Education for Excellence in the Digital Age

Roadmap 2023-2028

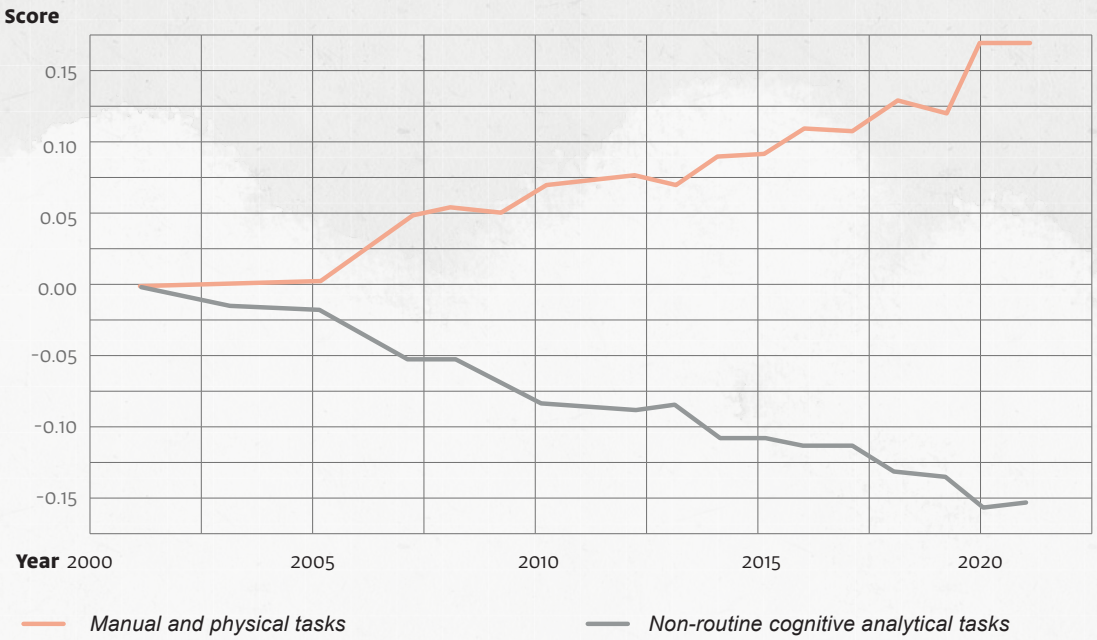
What awaits our children when they graduate from high school and step through the gateway of the adult world? What skills will they have acquired and what will we have stuffed in their school backpacks to prepare them for the next stage? In every generation, parents and educators are confronted with this question and together they strive to provide a suitable answer. Now it is our turn, and it is for all of us to respond and make sure the children of today are well-equipped for their future.

When we were kids, it seemed that our parents and teachers knew exactly what to do. Their overwhelming drive was to have us obtain a high school matriculation certificate that paved the road to university. As many followed this path, the eligibility rates for matriculation and academic degrees in Israel doubled. As a result, since the early 2000s only those who studied for high-quality matriculation with five units of mathematics were admitted to the more prestigious universities and from there proceeded to more remunerative jobs.

Drawing closer to the second quarter of the 21st century and with the doubling in the rate of graduates with five units of mathematics, another great change is underway. The children of today are exposed from an early age to a fast-moving world that is becoming increasingly connected. The digital revolution is changing the way we live, work, and pursue leisure. People relocate easily and frequently change their lifestyles, places of residence, and employment. To respond to this new reality, the next generation needs to adapt and upgrade their capabilities.

The job market is also changing rapidly. The digital revolution is reducing the number of employment positions centered around repetitive actions. Recurring tasks which require calculations are now carried out quickly and accurately by computers and robots. Service delivery, sales, and even programming are outsourced to countries with cheaper labor. In developed countries, there is a growing need for people who can think independently, collaborate as part of a team, and are eager to create and innovate using sophisticated techniques.

Types of Skills Required for the Israeli Labor Market 2001-2021



Source: Gabriel Gordon, Zak Hirsch, Yotam Margalit, *Changes in the New Labor Market: A Tasks and Skills Analysis*, Israel Democracy Institute, 2022.

1 Access to Education 1990-2012

Israeli society is at the forefront of these changes. As a country that built itself through excellence in science and technology, Israel is vulnerable to rapidly occurring and acutely volatile global changes. These tectonic fluctuations have led the Israeli economy to become sharply and increasingly split in two — on one side, the high-tech, innovation, and R&D industries, and on the other, the manufacturing, commercial, and service sectors, with gaps between them only growing.

The Covid-19 pandemic accelerated this growing disparity. During the lockdowns, those who possessed "new world capabilities" managed to learn, work, and maintain a certain degree of routine in the shadow of the crisis. Despite the difficulties and the need for social distancing, Israeli high-tech continued to grow and prosper, while many outside this sphere became disconnected and isolated, widening the already sharp gaps.

Since then, social systems that were overburdened and fatigued during the crisis, have returned to full functionality. Growth, employment, and education have returned to their earlier levels. However, changes in employment patterns continue. After the crisis, many prefer flexible work conditions, Work from home, and part-time arrangements. In the shadow of inflation and the deterioration in world markets, these preferences might endanger those less agile and prepared.

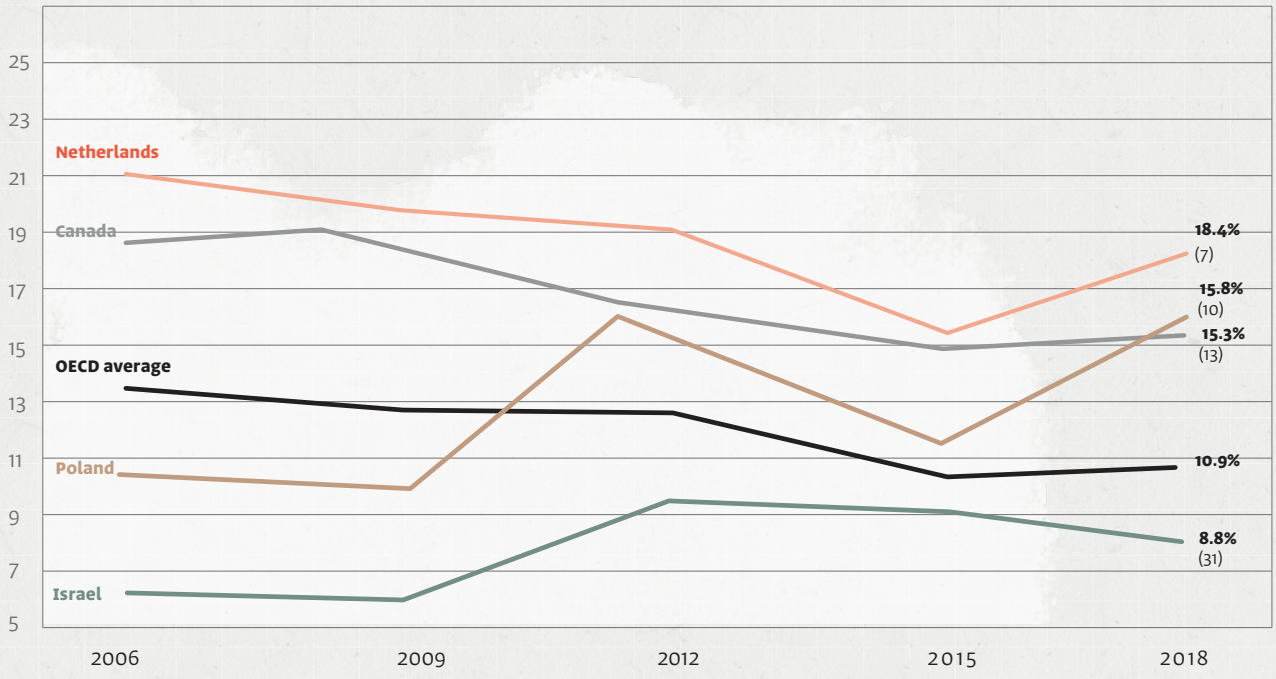
Implications for education

Education systems around the world, which in the past focused on transferring knowledge from adults to children, are now required to nurture young people towards deep knowledge and abundant skills - people who are capable of learning new content and creatively contending with complex problems in conditions of uncertainty. In today's world, those who understand how systems work and determinedly strive to optimize performance and pave new paths, will have the relative advantage.

How do these changes, which already engulf the reality of our lives, impact the current task that confronts our education system? What are the most important and relevant knowledge, skills, character traits and values our children need in this fast-moving, digital, competitive, and global world? And who should be charged with these questions — the international organizations that set global standards, the local workplace with its specific needs, or the designers of Israeli education?

If we refer to the Organization for Economic Co-operation and Development (OECD) and ask how many of Israel's youth are ready for their digital future, the answer is "nine percent." This is the rate of 15-year-old students in Israel who attain the high levels of comprehension, thinking and reasoning on the international PISA research in mathematics. PISA examines the "new world skills" to provide countries with information about their younger generation's readiness for the future that awaits them.

Rate of High Performing Students on the PISA Research in Mathematics 2006-2018



This proportion is consistent with figures in the Israeli labor market. An in-depth study conducted by the Aaron Institute in 2022 found that nine percent is also the proportion of high school students who graduate with a matriculation certificate that includes five units in mathematics, English, and physics or computer science. The study revealed that this combination of major subjects in high school is the most common among those employed in the areas of advanced technology in Israel.

The Ministry of Education gave much thought and deliberation in defining an updated policy for the skills of the new world, which it publicized in 2021 under the title of "An Updated Perception of Learning." According to the National Authority for Measurement and Assessment in Education, this document is partly consistent with the skills defined by the OECD as well as those identified as important for Israeli high-tech.

The education and higher learning systems in Israel have begun to adapt themselves to the changes taking place. As a result of collaborative policies, 16.6% of twelfth grade graduates take the matriculation examination in five-unit mathematics (an increase from 9,000 students in 2012 to 21,000 in 2021) and 12.5% of university students study engineering. During the past four years, the percentage of employees working in high-tech rose from 9% to 12%.

This expanding circle still includes mostly Jewish men from the center of the country.[2] The percentage of men working in technology positions is twice that of women and the same can be said for university engineering students and high school physics and computer science students. A gap of 50% is also seen between the center and the periphery of the country and between Jews and Arabs.[3]

This situation was the context for the work of a public committee appointed by the government in 2022 in order to recommend steps to expand and diversify the circle of talent in high-tech. Alongside the growth of the high-tech industry, the committee identified a new trend of people with technology skills employed by companies and organizations outside the high-tech sector. They use their digital skills in order to adapt and integrate technologies that improve operations in the fields of health, agriculture, banking, security, transportation, and education.

2 The Path of Excellence in Israel | 3 High-Tech Matriculation Rate and Five-Unit Mathematics

This is a profound and swift process occurring in Israel and is leading to greater sophistication, productivity and systemic efficiency. One in four (non-Haredi) Jews is now employed in a technology position and the need continues to grow. The committee, therefore, recommended ambitious targets with far-reaching implications for education. They included 50% growth in the number of technology professionals by 2030, with an emphasis on women, Arabs, and the periphery. [4]

The role of the Trump Foundation

Since its establishment in 2011, the Trump Foundation has supported the education system in expanding the circle of excellence in mathematics and the sciences. During its early years and together with partners, the Foundation concentrated on halting the decline in the number of high-school students graduating with five units of study in mathematics and physics. The Foundation's efforts were focused on teachers and teaching, to building a new generation of educators, developing expertise in teaching, and to generating partnerships to support quality teaching at scale.

Hundreds of new teachers were trained annually in special programs at institutions of higher education, most of them coming from high-tech and embarking on a second career as teachers. Under the Ministry of Education's leadership, the "From High-tech to Teaching" initiative was founded, which helps absorb the new teachers into schools. In addition, each week, thousands of teachers participate in professional learning communities, guided by university departments of science education.

Local authorities, districts, and education networks have led regional efforts that bore fruit. Among the cities that doubled the percentage of five-unit graduates are Kfar Saba and Ra'anana, Holon and Beersheba, Ma'alot, Umm al-Fahm and Shfar'am. The "Cities of Excellence" network accompanies the local authorities, helps train the leading teams, and holds joint learning sessions.

In the second phase of our work, we seeded the creation of a broad network of stakeholders to support the emerging change. A diverse coalition of organizations, corporations, and institutions was recruited to participate and coordinate under one shared umbrella ("Five times Two" — 5X2). With the Ministry of Education sitting in the driver's seat, this Collective Impact coalition imbued the endeavor with substantial energy while maintaining wide consensus and public support.

Five-Unit Mathematics Graduates 2006-2021

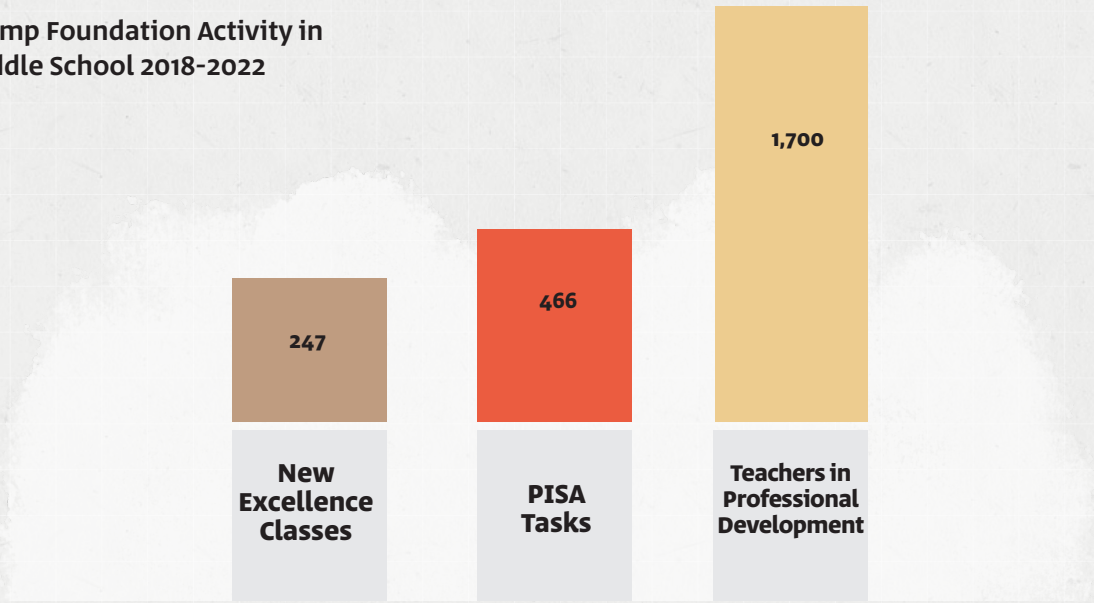
4 Public Committee to Increase Human Capital in High-Tech Recommendations for Education

As a result of these steps, the downward trend was halted, changed course and impressive growth began to make its mark. In 2018, 15.5% of twelfth graders who studied in high schools that prepared students for the matriculation examinations, completed five-unit mathematics studies, half of them were girls. In 2021, this high percentage climbed to 16.6% of students. An impressive growth trend was also recorded in both five-unit physics and chemistry.

The plan to double the percentage of five-unit students succeeded earlier than planned and resources remained in the foundation's budget. We therefore decided to take on a complementary effort that would build a strong foundation in middle school and lead to better preparation for the skills needed in the digital world. The goal was to prepare the ground so that more students would be able to practice these skills and take the path of excellence, regardless of ethnicity, gender, or place of residence.

To this end and in line with a roadmap we developed together with our partners, the foundation turned to top researchers and developers in Israel to prepare learning materials adapted to the acquisition of PISA high-order thinking and application skills. In partnership with districts, education networks, and local authorities, new excellence classes were opened in which this material is now piloted. Hundreds of teachers have participated in dedicated professional development.

Trump Foundation Activity in Middle School 2018-2022



The Foundation is now in the home stretch. It must join hands with the government to create the conditions required for expansion, upgrade, and diversification. It should assist government to prepare the infrastructure for ongoing growth and continuity. The roadmap for the upcoming years will therefore draw on the achievements of the past decade and engage with a future of much-needed changes in the scope of excellence.

Theory of change (2023-2028)

At the starting point of this final phase, the foundation finds itself with a reputation of overwhelming success with five units in high school and with preparing the ground for PISA skills in middle school. Standing behind these two endeavors is a wide network of education organizations, education networks, local authorities, districts, government agencies, high-tech companies, universities, colleges, schools and teachers.

This coalition of capabilities is now "on hold." Everyone is expecting the Ministry of Education to lead a national program incorporating the new skills into the formal curriculum and expanding tangible opportunities for excellence at scale. The public committee recommended that government defines a "high-tech matriculation" goal that includes a package of five units in mathematics, English, and physics or computer science; and an additional goal of increasing its rate of graduates from 9% to 15%, emphasizing female students, Arab society and the periphery.

It also recommends upgrading the curriculum with "power skills," such as solving complex problems, independent learning and teamwork. However, at present, this tech package of high school majors is not offered as a bundle but rather as elective items on a menu of multiple options. The content studied and the matriculation examinations in these courses do not yet include the relevant power skills. Since the government approved the committee's recommendations, the expectation now is that the Ministries of Education and Finance will formulate a comprehensive program in secondary schools (grades 7-12) that will focus on building these abilities and skills.

The Foundation's role in this enterprise will be to support the government-led project by harnessing data and research, enlisting experts, recruiting the professional community, building partnerships, developing content and tools, elevating public awareness and creating infrastructure. For this purpose, the Foundation will cooperate with other foundations and expert entities so that alongside mathematics and science, relevant aspects of computers, English, and social entrepreneurship will also be integrated.

1 Excellence Classes in Middle School

Middle school excellence classes have become the primary platform from which students continue towards "high-tech matriculation" majors in high school. These classes were built in the last decade via several initiatives intended to provide learning paths for outstanding students within the public school system. Currently there is a wide range of excellence classes, each with its own brand and operations.

In total, about 15,000 students per grade (roughly 11% of the students) study in these classes, comprised mainly of Jewish male students from the center of the country. The leading programs that operate excellence classes are - "Science Technology Cadre" classes, administered by the Ministry of Education in 250 schools; the MOFET association that operates excellence classes in 130 schools; and the Trump Foundation's efforts that helped establish 230 new excellence classes run by local authorities, education networks and districts.

These classes offer two to six supplementary teaching hours per week dedicated to acceleration, enrichment, or deepening the knowledge of mathematics. Many also include physics and some exposure to computer coding. Most of them do not yet teach mathematical modeling or reasoning, nor computer networks and data systems, tech English and the incorporation of hands-on integrative projects.

Our goal, therefore, is to assist government in expanding, upgrading and diversifying the excellence classes. The intention of the Ministries of Finance and Education, following the recommendations of the Public Committee, is to double the number of classes so that about 30,000 students from each grade in middle school will attend them, with an emphasis on female students, Arab students, and students from the country's periphery.

Once government delineates an expansion and diversification program for the excellence classes, the Foundation's role, together with colleague foundations and centers of expertise, would be to catalyze and upgrade educational content in mathematics, physics, computers, English and social entrepreneurship. The Foundation will harness high-tech companies to voluntarily join the effort by providing mentoring and motivational enrichment activities for students and teachers.

2 The Mathematics Curriculum

Based on the experience of high performing education systems around the world, we learn that there are no shortcuts to attaining sustainable improvement at scale. Supplementary study tracks are very important in order to drive excellence and to catalyze bottom-up dynamics. However in order to achieve systemic change, it is critical to adapt the formal curriculum to incorporate the new skills. The formal curriculum that defines standards and measures, is the most influential vehicle for government to set and implement its educational policy.

An analysis of the Israeli mathematics curriculum as compared to those of other countries, however, reveals differences. Alongside building deep conceptual knowledge, acquisition of procedural fluency, and attaining a high level of abstract thinking, which characterize our curriculum, other countries have already added the new world skills to their mathematics curriculum, which includes modeling, reasoning, creative thinking, and problem solving in real-world contexts.[5]

In recent years, the Ministry of Education has begun to institute changes in its curriculum for high school. These changes are intended to create congruence between mathematics contexts studied in each one of the levels of high school mathematics and the future life courses of the learning track graduates. For example, the three-unit level will be geared towards everyday contexts while the five-unit level will concentrate on advanced abstract and practical applications.

At present, the Ministry is preparing to formulate a comprehensive adaptation of the middle school curriculum that will also incorporate modelling and reasoning skills. To this end, it is planning to carry out revisions to the textbooks, learning materials, and examinations. To fuel wide-scale implementation, the Ministry is preparing for professional development and instructional coaching for thousands of mathematics teachers.

In this venture, the Foundation's role will be to make knowledge accessible, enlist the professional community to provide access to the content infrastructure developed by the Foundation's partners, and to support teachers in the processes of adapting their pedagogy.

3 Excellence for Good

The core of our undertaking is intended to create a deeper connection between content learned in school and the world that surrounds and awaits the students. At the most basic level, we expect students to be more engaged as their learning becomes more relevant, interesting, and meaningful. We believe that such enhanced content will motivate more students to choose taking upon themselves the greater effort that excellence tracks demand.

Another reason for creating a link between learning and the world, which is mentioned above, is that students will build knowledge and acquire abilities important to their future. Parents' aspiration to provide their children with keys to future doors lies at the heart of this practical connection.

There is, however, a deeper reason, the one underlying the aspiration to excellence. The pursuit of excellence stems from a value-driven mission of concern for the other, for human and social needs, for the community and the environment. The moral contract between a society that invests in promoting excellence and the students that receive this investment, is that in the future, they will harness their abilities to improve the society in which they live.

5 Mathematical Thinking in School Model

The foundation will spearhead a focus on the moral and social aspects of the desire for excellence. Solving real-life problems in classrooms is already a step in this direction. Nonetheless, there are important skills, such as independent learning, presenting arguments, and teamwork, as well as values of moral responsibility and improving society that are not yet part of classroom learning.

We will explore how to create a practical connection between classroom learning and real issues confronting the local community and society. This will be achieved by challenging students to use their knowledge and knowhow of numbers, models, and technologies to help solve real problems. We will do so in collaboration with organizations specializing in creating such educational projects.

In middle school, this effort will focus on the excellence classes, by adding the element of integrative and collaborative projects. In high school it may involve the "social matriculation" element that was introduced by the Ministry of Education several years ago, in order to encourage students to volunteer for the community.

What Does Success Look Like?

We aim for 30,000 middle school graduates completing their studies in an excellence class in the school year of 2028. Half of them will be female students and many will be from the periphery and Arab society. The excellence class curricula will provide a solid foundation of knowledge and skills needed to continue on to elite learning tracks in high school.

The public's awareness of excellence classes will grow among parents and students (currently 53% are unaware). Many students, regardless of gender or ethnic background, will express a desire to study in these classes and perceive them as a springboard for a better future. They will also see this choice as a value-driven and social mission intended to help them create a better world for all.

The mathematics curriculum and the final examinations in middle school will be adapted to include skills relevant to the new world. These skills will be incorporated into the digital textbooks and learning materials, and teachers will acquire the pedagogical tools needed to teach them. As a result, on the international PISA assessments of 2028, Israel will be counted among the 15 excelling countries in mathematics.

This impact will also be witnessed in high school, with 15% of twelfth grade graduates completing their studies with a "high-tech matriculation" which includes five-units of mathematics, English, and physics or computers. There will be more female students, students from the periphery, and from Arab society, learning in this track. This growth will influence the rate of engineering studies in university and in those attaining technology and science-based positions in the labor market.

And above all, when our children leave the school system, they will be well-equipped with the knowledge, skills, traits, and values they need. Israel's cadre of technological excellence will no longer be a closed, homogeneous and exclusive circle. It will open its doors to everyone prepared for the challenge and will give them the opportunity to be one of the pioneering forces that breaks new ground in areas of local, national and global importance.