Abstract Booklet

Background materials for discussions

THE EDDIE & JULES
TRUMP FAMILY FOUNDATION
קרן טראמפ

Abstracts - background materials for discussions

Perception of Excellence During Wartime

Opinion Surveys of the Israeli Public and High School Students

After two years of crisis and war, we wished to examine whether there have been changes in public perceptions of excellence, success, dreams, and concerns about the future. We assumed that perspectives would shift or at least be influenced by the prolonged state of emergency in the country. Prior to the war, Israelis viewed high-tech, the military, medicine, and science as fields in which Israel excels. High school students regarded mathematics and English as subjects to be taken seriously in order to realize their future dreams. Students in the five-unit track tended to believe they were capable of meeting the challenge and were on the path to success.

To explore this, we commissioned two research and survey institutes (Dialogue and IPanel) to conduct two surveys in May and August 2024. The first survey targeted a representative sample of the Israeli public, repeating questions from a 2022 survey conducted ahead of "Israeli Excellence Week." The second survey targeted a representative sample of Israeli teenagers as the 2024-2025 school year was about to begin.

Main findings

1. According to Israelis, the fields in which Israel excels in 2024 are high-tech (80.8%), the military (67.8%), medicine (51.2%), and science (44.1%). Fields where Israel excels less include cooking (15.1%), music (10.4%), sports and politics (6.5%), and cinema (4.9%). These findings are remarkably similar to those from the 2022 "Israeli Excellence Week" survey.
2. According to the survey, what drives individuals who excel in Israel is the desire to challenge themselves (68.8%), the aspiration to be the best at what they do (61%), and to develop abilities and develop themselves (59.6%). Less significant motivations include giving of themselves to others (34.9%), enjoying the journey (16.1%), and seeking recognition and attention (14.3%).
3. When asked, "What is your dream? Where do you see yourself in 10 years?" a third of the teens (32%) responded: "High-tech professional." Surprisingly, girls aspire to high-tech careers more than boys. The next most popular responses were "Doctor" (11%), "Military officer" (11%), and "Famous artist or actor" (9%).
4. When asked, "What do you need to study today in school to achieve your dream?", high school students answered: English (61%) and mathematics (50%). Other subjects received low percentages. Students aiming for high-tech careers said mathematics was the most important subject for them (79%).
5. High school students greatly appreciate their parents, with 84% saying that their parents strongly encourage and support them in pursuing their dreams. In contrast, the majority of teens (71%) believe that the education system does not really provide them with the tools they need to succeed in life.
6. Surprisingly, most high-school students (83%) state that they believe the war will not have a significant impact on their ability to achieve their dreams.

Building Israel's Future Generation in Science and Technology - Experts' Recommendations for the Trump Foundation

Effective Research for Impact (ERI)

In the digital era we live in, dizzying technological breakthroughs in the fields of artificial intelligence, machine learning, and big data are already accelerating the rapid pace of change and bringing along with them new challenges and opportunities. Those who acquire the tools and competencies required for these fields will be the leaders who shape and steer the scientific and technological developments in the near future.

Israel is at the forefront of the technological revolution, which is speedily and vigorously approaching. These turbulent waves are encountering an Israel in the midst of a complex period of war and trauma. Thousands of students from the South and the North were evacuated from their homes and attend temporary schools. Students in the Center of the country are attempting to return to the routine of studies, though with a curtailed curriculum and a schedule of reduced hours.

In preparing the Trump Foundation's roadmap for the next decade, we turned to the Effective Research for Impact (ERI) institute. We requested that the institute's researchers interview 18 of the foundation's partners with the aim of receiving feedback regarding its activities to date and recommending desirable courses for action for the future. The interviewees were: Tal Alexandrovitz, Yaakov Amidror, Sagy Bar, Gila Ben Har, Asaf (Pizzer) Cohen, Zehavit Cohen, Eli Eisenberg, Muhana Fares, Hilla Haddad Chmelnik, Noa Heymann, Eugene Kandel, Ami Moyal, Ronen Nir, Varda Ofir, Alan Feld, Kobi Shvarzbord, Sergei Sumkin, and Meirav Zarbiv.

Main findings

1. The Trump Foundation has succeeded in making a profound impact on the awareness of the education system, teachers, parents, and students. The aspiration for excellence has become a driving force. This is an extraordinary achievement in the education arena and stands out in the philanthropic field, which often focuses on the supply side and responding to demand.
2. The Trump Foundation stands out for its ability to initiate very wide-ranging systemic change processes, both with respect to the five-unit target for high schools and in increasing the number of excellence classes in middle schools. The foundation has driven government policy, and all the entities involved in its implementation.
3. As part of these processes, the foundation implanted deep pedagogical infrastructure into the education system, including adaptive learning, online learning systems for students in the periphery, establishing professional learning communities for teachers, and new teacher training programs.

4. The Trump Foundation's organizational DNA is its ability to identify national needs, develop innovative solutions for them, recruit many partners for action, and create a strong reputation and positioning that grants access to decision-makers and drives sustainable change.
5. Looking ahead to the next decade, the main recommendation for the foundation is to adapt the education system so that it can prepare the coming generation of scientists and developers for the artificial intelligence age. This should be carried out through a significant upgrade of content and teaching methods, and by creating partnerships with the fields of science, high-tech, and the defense industry.
6. In terms of learning content, emphasis will need to be placed on statistics, data science, and linear algebra. To reach a broad scope of activity, there will be a need to invest in training new teachers, developing advanced teaching capabilities and create online tools for self-learning.
7. Substantial emphasis will need to be placed on acquiring the learning skills necessary for success in the modern workforce, particularly on: independent learning, problem-solving ability, and teamwork. To this end, it will be necessary to enrich and diversify teaching and learning methods and to adapt methods of assessment and examination.
8. Regarding emotional skills, most of the interviewees did not assign high priority to this area. They believe that the system is overly burdened with these issues. However, they do believe that attention should be given to enhancing the sense of self-efficacy and coping with failure, particularly among female students.
9. The foundation should consider dedicated activity in the social periphery, including building up advanced teaching capabilities and access to quality education for excellence. Such an investment has social and moral significance, not to mention its contribution to the needs of the labor market.

Interviews – Main points

1. Tal **Alexandrovitz-Segev**, Strategic Communications Consultant. In the coming years, Israel's defense industry will be the focus and receive high priority. The same skills needed for high-tech are also relevant for military technologies. The foundation should create collaborations with the defense industry, as it did with the high-tech industry. The foundation has a unique ability to drive the entire state of Israel toward solving problems and building capabilities, and it must act on this now.
2. Yaakov **Amidror**, former Chairperson, National Security Council, Prime Minister's Office. Israel must continue to be at the forefront of technology. There is a need for skills in estimation and assessment, the ability to formulate and ask questions, and a broad knowledge of the world. The foundation should ensure that all these endeavors begin at a young age, already in kindergarten, and identify the gifted in the periphery as well as in the ultra-Orthodox sector. Likewise, outstanding scientists must be located and returned to Israel, and laboratories and research infrastructure must be built for them.

3. Sagy **Bar**, CEO, Cyber Education Center. The artificial intelligence revolution is expected to substantially change teaching and learning in schools. Students must learn using an approach that enables flexibility and which incorporates, alongside educational content, learning skills such as problem solving and artificial intelligence. Upgrading the education system is likely to expand the gaps, especially in the periphery and among female students in the religious sector. The foundation should ensure that applied skills are integrated and upgraded in response to the artificial intelligence revolution.
4. Gila **Ben Har**, former Executive Director, Center for Educational Technology (CET). Students lack the fundamentals of reading comprehension and digital literacy, which are required for advancement and to prevent the creation of gaps. A great challenge is recruiting and training teachers to become experts in the new technologies and at the advanced levels, especially in the periphery. Students were harmed due to the war, their ability to pay attention and concentrate was damaged. The foundation should ensure that the system identifies outstanding students at an earlier stage and that they study in small groups.
5. Asaf ("Pizzer") **Cohen**, former Deputy Commander, 8200 Unit, IDF. In the coming years, the most important skills will be quick independent learning, the ability to collect and process information from different sources, to identify the important points, and to create new patterns and original ideas. Students need hands-on experience, they need to investigate, critique, and create on their own. The foundation should focus on developing independent learning abilities and information processing, while encouraging collaborations with the high-tech industry.
6. Zehavit **Cohen**, Researcher of mathematics teaching, Technion. The endeavor to link mathematics to the real world finds curious and interested students. The male students relate well to the complex mathematical aspects while the female students see importance in the possibility of mathematics to improve the society in which we live. The foundation shoשuld continue the actions it took in recent years and grow excellence starting in the middle school stage.
7. Eli **Eisenberg**, former Senior Deputy Director General, ORT Network and Head of the ORT Administration for R&D and Training. The technological era, in which knowledge is processed by computers, raises the importance of skills among human beings. To excel, people need the ability to learn independently, for teamwork, the ability to solve complex problems in an environment of uncertainty. The Trump Foundation must influence government policy by establishing a national council for science and technology and formulating educational strategy for the age of artificial intelligence.
8. Muhana **Fares**, former Head, "5X2" Project, Ministry of Education. The indices of excellence in Israel have been advancing in recent years; now, the effort must be continued and deepened. Cooperation with local authorities should be expanded, parents involvement should be increased, more excellence classes opened, especially in the periphery. The foundation should focus on new-world skills and collaborate with the Ministry of Education to implement them into the curricula and municipal model.

9. Alan **Feld**, Partner, Vintage Investment Partners. In the coming years, the artificial intelligence revolution will make knowledge highly accessible. People will need to possess critical thinking skills, as well as the ability to present positions and explain them clearly. The ultra-Orthodox learning method, the havruta, is better suited to the type of joint learning needed in the current era. It is recommended that the foundation focus on methods of learning and teaching, and that it assist the education system in making the transition from frontal teaching and memorization to inter-disciplinary learning, group discussion, and learning for the love of it.
10. Hilla **Haddad Chmelnik**, former Director General, Ministry of Innovation, Science, and Technology. In the coming years, the artificial intelligence revolution which is approaching will be a "tsunami." The education system will need to place emphasis on mathematics, statistics, and linear algebra. The mathematics curriculum must undergo an upgrade. The challenge will be to train good teachers on a wide enough scale. The foundation should drive the project to adapt the education system to the artificial intelligence age.
11. Noa **Heymann**, former Deputy Director, Budget Department, Ministry of Finance. The education system is not prepared to promote excellence on a large scale, and it lacks the flexibility and administrative capacity to support it. Educational authority should be decentralized to local authorities and schools; regional centers of expertise should be created. The foundation should build deep cooperation with the Ministry of Finance to promote structural reform of the education system and to develop innovative models which can be expanded and sustained over the long term.
12. Eugene **Kandel**, former Head, National Economic Council, Prime Minister's Office. The task of doubling the number of high school graduates with five units of mathematics was relatively easy in contrast to the change expected in the labor market. Israeli students will need to possess the ability to learn quickly, adjust swiftly, and engage in teamwork. The education system requires radical change, including the cancellation of all matriculation examinations except for language, English, mathematics, and computers, and it should employ distance learning. The foundation should promote excellence in mathematics and science, while also integrating the humanities, creativity, and curiosity.
13. Ami **Moyal**, President, Afeka Academic College. The coming years will be characterized by great change in the labor market in light of the artificial intelligence revolution. Workers who are skilled in using AI tools will be in demand. The education system must focus on imparting these tools and nurturing skills in critical thinking, teamwork, ability to present to an audience, and independent learning. The foundation should work to establish a national council for science and technology, expand the circle of excellence, and focus on skills.
14. Ronen **Nir**, Managing Director, PSG Equity. Due to the rapid changes taking place, it is difficult to predict the skills the labor market will need in ten years. Therefore, applied skills are needed, such as the ability to learn independently, teamwork, solving complex problems, and the ability to cope with difficulty and failure. The foundation should turn its attention to pedagogical change and help the education system transition from teaching by the teacher, to independent and group learning with the help of technology.

15. Varda **Ofir**, Director, Central District, Ministry of Education. The focus on excellence is appropriate only for high school. At younger ages, the ranks should be opened up, and excellence classes should not be created. There are fundamental skills that should be imparted prior to embarking on the race towards excellence, such as compassion, cooperation, and social responsibility. The foundation should apply a more holistic approach to excellence which gives status to the values of equality and inclusion and expands beyond the STEM fields.
16. Kobi **Shvarzbord**, Physics Teacher, Leo Baeck High School, Haifa. Today, exposure to scientific fields at a young age is insufficient. Excellence classes should be expanded, and teachers' professionalism should be improved especially in physics and computer science. The foundation should deepen its work in middle schools, create prestige around these schools, offer incentives for quality individuals to become middle school teachers, and promote teacher communities.
17. Sergei **Sumkin**, Senior Researcher, Aaron Institute for Economic Policy, Reichman University. The designation of "high-tech matriculation" as a government target backed by significant resources is a considerable achievement. The great challenge now is translating this target into practical programs and managing their implementation well. Artificial intelligence will upgrade high-tech matriculation studies, and this is a big opportunity. The foundation should closely support the government in the implementation, ensuring data-driven management, and inter-sectoral cooperation.
18. Meirav **Zarbiv**, Deputy Director General and Head, Innovation and Technology Administration, Ministry of Education. The changes required to adapt the education system to the era of artificial intelligence will face a shortage of skilled teachers. The education system is unable to keep up with the pace of change coming from the world and the high-tech industry. The challenge is particularly acute in the periphery, due to the great shortage of teachers and equipment. The foundation must assist in assimilating new-world skills, developing assessment measures, training teachers, and promoting excellence in the periphery.

Formal Secondary School Education During the War – October to December 2023

Oren Majar, Rakefet Hayman-Zehavi

The war which erupted on the seventh of October led to the evacuation of roughly 250,000 residents from Israel's north and south. In the initial weeks of fighting, the education system was forced to cope with over 40,000 uprooted students and staff, alongside the devastating news about tens of teachers and students who were murdered or kidnapped. Learning at the different levels of education across the entire country was disrupted when 184 principals and more than 3,000 teachers were drafted to reserve duty, and the entire system was coping with bereavement, trauma of varying degrees, sirens, and rocket fire.

We approached journalist Oren Majar to document what occurred in the secondary education system between the Simchat Torah holiday (October 7th) and Hannukah (December). Majar's documentation is based on conversations with a wide range of education professionals, including volunteers, principals and teachers, heads of municipal education departments, subject coordinators, and third sector professionals, as well as on government and Knesset publications, social media posts, and media articles.

Main findings

1. During the first three months of the war, two parallel education systems of differing quality were created. Evacuated students studied mostly three to four hours a day in temporary schools, with about half of this time devoted to strengthening resilience and alleviating stress. In parallel, students across the country who were not evacuated from their homes, gradually returned to nearly normal school routines.
2. The impact on students who were displaced from their homes has been severe, whether they missed a few months of studies, or even a full academic year, or their matriculation certificate was negatively impacted. Some educators expressed concern over a loss of meaning which could lead the young people to a sense of alienation and leaving the country. Notably, dropout rates and absenteeism were more prevalent in *Mabar* and *Ometz* classes (for lower achieving and motivated students) and less so in excellence classes.
3. Thanks to the spirit of volunteerism, the educators' ethos and professional knowledge, the evacuated students received a fitting educational response. Directors of evacuation centers emphasized that the freedom of action the Ministry of Education granted them allowed them to show flexibility and create solutions tailored to the immediate needs in the field.
4. Schools acted as a social anchor and provided students with solutions that went beyond the field of learning. Initially, the education system emphasized non-formal activities and emotional responses, with the "learning" component being secondary. In many cases, the students were those who expressed a desire and

need to learn, and teaching staff in many schools found that a main source of resilience for the students came from routines that imparted meaning and a sense of normalcy.

5. Noticeably absent was a database with information about the evacuated students, which would have facilitated management of student registration and attendance by both evacuated and hosting local authorities. Another difficulty stemmed from the multiple parties involved in absorption and creation of education solutions for the evacuated students.
6. In cases where motivation was high, technological infrastructure allowed for creative solutions to complex situations, such as heterogeneous classes and a shortage of teachers.
7. The government saw itself as obligated to provide educational solutions and frameworks to residents who left their homes due to the fighting. The Ministry of Education established field administrations and temporary schools with record rapidity, recruited and moved manpower, and funded education initiatives within a short time. It granted autonomy to the local government, though some local authorities claimed that the Ministry left them to manage the challenge alone, with late and delayed support.
8. Considering the difficult situation of most of the evacuated students (burnout, huge learning gaps, low attendance rates, at-risk status, violence, alienation, and absence of parental authority), the report's authors suggest dedicating budgets and administrative attention, and to provide the evacuated students and teachers with an emotional and academic basket of assistance. The students and teaching staff need a remedial experience of excellent teaching, advanced facilities, personal attention and emotional therapy that will help them narrow the academic and emotional gaps. It is fitting and right that these resources will be at the disposal of the evacuated students even after their military service since it is reasonable to assume that they will not manage to close all the gaps by the end of high school.

Mathematics Teaching During the "Swords of Iron" War

Nitzhia Peleg

Education during war requires creativity and perseverance. With the outbreak of the war, the education system across Israel closed down, with efforts to transition to remote learning. Teachers found themselves suddenly facing a disrupted reality, requiring them to address enormous challenges and bring order to the chaos. Mathematics is known to be particularly sensitive to such changes, given the gap between its importance and its inherent difficulty. Mathematics is a rational and theoretical subject, disconnected from the ongoing events, and is taught using symbols, signs, and formulas, which are especially hard to teach and learn remotely.

To document how mathematics teachers coped with this sudden and immense challenge, the foundation turned to Nitzhia Peleg, a mathematics teacher and leader of teacher communities. From November 2023 to January 2024, Peleg held meetings with 25 teachers, subject coordinators, mentors, and supervisors from various districts and the Ministry of Education. The goal of these meetings was to present and analyze in real time how the education field and leadership operated during the immediate emergency period, without prior preparation or planning.

Main findings

1. Teachers indicated that they exercised autonomy in determining how they would operate. In the emergency situation, they paid little attention to the guidelines from the Ministry of Education or the expectations of the school administration.
2. For example, the Ministry of Education directive was to not begin learning but instead to focus on recreational and enrichment activities. However, mathematics teachers believed that returning to academic routine, particularly through a mathematics routine, would better benefit their students, and so they acted accordingly.
3. As a result, in the first phase, there was an effort to create continuity in mathematics learning, despite the school closures. Learning mathematics became both an escape and a form of healing, and a means through which teachers discussed the situation with students.
4. At this stage, teachers also dealt with students' lack of motivation and engagement. Some did not attend lessons at all, while others connected to the class on Zoom but did not listen to the lesson. Many struggled to complete assignments and homework and to demonstrate the required level of student involvement.
5. The solutions teachers provided focused on personal interactions, such as individual conversations and sending encouraging messages to students: "Don't let Hamas win," "Learning is resilience," "You are the future of the country," "This is your responsibility on the home front," "When the war ends, you'll be behind."

6. Various issues arose regarding teachers' availability. Challenges included teaching from home while their own children were present, teacher absences due to military reserve duty, anxiety over the situation, and difficulty dealing with constant changes.
7. As remote teaching continued, learning weakened. Teachers, drawing on their experience from the COVID-19 period, realized that online teaching was not truly effective, did not foster meaningful learning, and made it hard to create interactions. Students did not retain information or put in effort (knowing the material would be re-taught in class later).
8. The Ministry of Education decided to trim the curriculum, cancel exams and grades, and shorten both lessons and the school day. Teachers reluctantly had to slow the pace and depth of teaching and learning. Geometry was removed from the curriculum, with hopes to return to it once schools would reopen.
9. There was a significant difference between teaching and learning processes that took place throughout Israel, generally, and those that took place in the evacuation centers for displaced individuals from the South and North. In these centers, the primary challenge was not remote learning but rather highly dispersed classes, extreme heterogeneity, and the direct confrontation with the disparities between the periphery and central regions of the country.

Education System Responses to Displaced and Refugee Students – Examination of Activity Worldwide and Case Study Analyses

Ofir Marer

Following the events of October 7th, large populations from the South and North of Israel experienced displacement, with many of the evacuees, including children and teenagers, who have endured significant trauma. According to data from the Ministry of Education, about 48,000 students were displaced from their homes in the initial months of the war. Over the course of the year, the number of displaced students decreased, and by the beginning of the 5785 school year (2024/25), approximately 16,000 displaced students remained, ranging from kindergarten through 12th grade. School attendance officers are warning of both an observable and hidden dropout phenomenon among 20-30% of the displaced students.

Ofir Marer conducted a literature review of case studies and international research to learn how organizations and countries that have experienced internal displacement (refugees within their own country) have addressed educational challenges. The study aims to provide professionals with tools based on the accumulated experience of other nations and offer recommendations that can be applied in Israel.

Main findings

1. Education serves as a significant anchor and an essential complementary framework for children who have experienced displacement. On the other hand, a disrupted educational routine can harm students' academic, social, and economic development. Nevertheless, in many cases, education is given secondary priority compared to other needs and is seen at most as a supplementary response.
2. The risk of harm to the development of girls is five times higher than to boys, as is the likelihood of their dropping out.
3. Central challenges faced by displaced populations in the field of education include a lack of available infrastructure (both physical and virtual), safety in the learning environment (both physical and mental), a shortage of teacher training and employment difficulties in the education system, language barriers, and financial costs.
4. For displaced students to be present and succeed in their studies, they must receive tools to personally cope with trauma. This includes psychological support through tools to identify the trauma and treat it, fostering a sense of belonging, and enhancing the ability to cope with emotional difficulties and pressures, and to become resilient.
5. Building meaningful social connections, family support, and strengthening friendships between students will help them face the challenges confronting them.
6. Schools should provide a safe and clear physical and mental environment for students during the crisis, free of pressure, with complete and continuous involvement of teachers and ongoing communication with parents.
7. Signs of trauma, such as depression, anxiety, and PTSD, appear in 40-50% of displaced persons and refugees following crises.

Recommendations for Coping with the Trauma of Displaced Students:

1. Collecting, tracking, and analyzing student data - personal, familial, and academic - prior to and during displacement, focusing on factors influencing students' ability to cope with the situation.
2. Creating a broad community support system within the school space that includes parents, students, community members, educators, and decision-makers, to promote a sense of security. This should include access to mental and social support systems, and healthcare services.
3. Developing specialized training for teachers that includes awareness of signs of trauma and ways to address it, developing appropriate emotional abilities, and use of techniques to prevent ongoing secondary trauma, among others.
4. Additional actions: prioritizing specific populations, employing displaced educational staff, providing tailored responses for different groups, and offering financial and legal assistance to exercise rights.

What Are the Key English Language Skills Needed for Working in Israel's High-Tech Sector?

8200 Alumni Association

When Israeli high-tech companies are asked what the most important skill for their employees is, the first answer is: English. In a longitudinal study of employees in Israel's high-tech sector conducted by the Aaron Institute, it was found that nearly all of them studied English at the highest level (five units) in high school, and many have near-native English proficiency. As a result, the Israeli government decided to promote "High-Tech Matriculation" studies, which include five units in English, alongside five units in mathematics, physics, and/or computer science. The government also decided to add an extra weekly English class to all new excellence programs it is establishing in middle schools.

However, the prevailing feeling is that the five-unit English curriculum is not sufficient for the needs of high-tech companies. The Perlmutter Committee to Increase Human Capital in High-Tech even recommended emphasizing English-speaking skills, which are not adequately addressed in high school. In light of this, the foundation approached the 8200 Alumni Association to carry out an in-depth study of the specific English language skills required for high-tech in Israel, based on the types of companies and roles. The research team was also tasked with examining international standards in the field and comparing them to Israel's English curriculum. The team reviewed documents from Israel and abroad, conducted surveys, and interviewed teachers, education experts, and employees and managers from the high-tech industry.

Main findings

1. The Israeli high-tech sector places great importance on advanced English language skills. The most important skill for Israeli high-tech is the ability to read and write emails and professional materials in English, followed by listening comprehension and speaking skills for viewing or delivering presentations.
2. There is no significant difference between types of companies (start-ups, development centers, full-scale companies), but there are notable differences between job types: growth roles require high-level speaking skills and listening comprehension, while research and development roles focus more on reading and writing skills.
3. There is a difficulty in finding candidates in Israel for high-tech positions who have a sufficient level of proficiency in English. As a result, many high-tech companies are outsourcing jobs to English-speaking countries or to countries with skilled workers who have strong English language capabilities.
4. Unlike European countries, Israel's high-tech industry does not use international standards for assessing English proficiency (such as CEFR), and most are not familiar with them. Candidate screening for jobs relies solely on the personal experience of the interviewer, without reference to these standards.

5. English language education in the Israeli school system starts in third grade and continues through twelfth grade. In 2021, 43% of high school graduates took the five-unit English matriculation exam. The Ministry of Education is working to upgrade the English curriculum to align with international standards, with an emphasis on spoken language.
6. There is a severe shortage of English teachers, which has led to a reduced supply and a decline in teaching quality. Due to the demand for English speakers in the labor market, many teachers are leaving the education system. Nearly half of the teachers lack the required qualifications, and some are even embarrassed to speak English in the classroom.
7. Due to the large class sizes and the varying levels of student proficiency, many teachers report that it is very difficult for them to engage in personal conversations with students, leaving many students behind. Teachers noted that speaking and writing skills are the weakest among their students.
8. The research indicates that school-based English education does not adequately prepare students for work in high-tech, as the level is insufficient. The main sources for acquiring English proficiency come from outside the school: the home environment, living abroad, private tutoring, and using technology.
9. The researchers recommend that English education for students in excellence tracks aimed at integration into the high-tech industry should rely primarily on independent learning. AI-based technological tools could significantly contribute to improving English language skills and overcoming learning and teaching gaps in schools.

High-Tech Matriculation – How to Promote it in Schools and the Education System

Ofer Rimon

"High-tech matriculation" is a new name given to the set of matriculation examinations built on a combination of five units of mathematics, English, physics and/or computer science. In the longitudinal study conducted by the Aaron Institute, this composition of matriculations was found to be the best predictor of future employment in Israeli high-tech's R&D units. This study served as the basis for the work of a government committee whose recommendations turned into a government decision, policy, targets, resources, and incentives.

The high-tech matriculation index in Israel (the proportion of "high-tech" examinees among all 12th grade graduates) increased from approximately 6% of education system graduates in 2012 to about 12% in 2022, this, as a result of the increase in the number of those studying five units of mathematics. In 2023, however, the beginning of a declining trend can be seen, which is continuing into 2024 as well. The government target is to reach 15% of graduates during the next five years, which constitutes about 20,000 of 12th grade graduates annually. At present, the government is preparing to implement the target and dedicate significant budget to it.

In the endeavor of preparing the education system and the Trump Foundation for this topic, we turned to Ofer Rimon, the former deputy executive director of "Tikshuv" – Technology and Information Systems at the Ministry of Education, who established and managed the Ministry's excellence program for middle schools (Scientific Technological Program - Amat). We asked Rimon to study the issue in depth and to recommend how schools in Israel can encourage both male and female students to sign up for the high-tech matriculation study track.

To this end, Rimon identified ten schools which had shown the most significant increase in the high-tech matriculation index in recent years. Schools from different areas, sectors, and backgrounds were selected in order to identify similar and different aspects of school preparation. School principals, subject coordinators, as well as Ministry of Education policymakers were interviewed. They were asked how the school prepared itself to promote excellence from the perspectives of pedagogy, getting organized, and increasing student demand.

Main findings

1. In recent years, the Ministry of Education has 'taken its foot off the gas pedal' regarding all matters related to strengthening excellence in mathematics and English. According to the State Comptroller's report, the Ministry's special programs for these issues were, in practice, unofficially discontinued. The priority previously

given dissipated and the resources shrank. Without the Ministry of Education's determined leadership and announcement of the policy as a flagship program, it will not be possible to reach the targets.

2. The concept of high-tech matriculation is not known in the schools and in practice, the options available to students in choosing a track in high school still do not include this type of "package." Schools that were successful in advancing in this area were those that promoted "excellence" in subject areas which are the basis for excellence (mathematics and English at the five-unit levels) and complementary subjects (physics and computer science).
3. With a six-year vision, these schools prepared three-year programs for both middle school and high school, establishing specific targets and indicators. They opened more than one five-unit class in each subject area, reduced the number of students per class, created diverse learning levels and encouraged students to move their level up. The more the demand rose, the more classes these schools opened to meet the demand.
4. A central element of management in the schools which succeeded was the commitment to collecting, analyzing and using data. The schools closely monitored each student's progress and difficulties starting in seventh grade and up to 12th grade. An individualized study program was created for each student with ambitious goals and a system of ongoing feedback and support from the school staff.
5. To raise demand among students and their parents, the "high-tech matriculation" package should be branded as a prestigious track that is a steppingstone to serving in the IDF's technology units and as a pathway into the Israeli high-tech industry. Schools should construct the entry routes to high-tech beginning in middle school and at every station along the way in order to allow as many children as possible to fulfill the Israeli dream.
6. The Israeli high-tech industry should be much more deeply involved in school excellence programs and in recruiting teaching personnel from among former high-tech workers. It is very important for high-tech companies and military technology units to adopt the program. These entities play a significant role in shaping children's perceptions of the future and in demonstrating the knowledge and skills required.

High-Tech Matriculation Index

Ophir Pines-Paz, Aliza Bloch, Sivan Landman, Tel Aviv University – Cities of Excellence Network

A 2022 study by the Aaron Institute for Economic Policy on the Israeli high-tech sector found that of approximately 400,000 high-tech employees in Israel, 64% studied a "package" of advanced subjects in high school, including five units in mathematics, English, physics, and/or computer science. This combination was significantly recognized as an important predictor for future employment in research and development positions within Israeli high-tech. Following this research, the governmental Committee to increase Human Capital in High-Tech recommended setting a national goal to increase the number of graduates with a "High-Tech Matriculation" package from 9% in 2018 to 15% by 2028. The Israeli government adopted the recommendations, allocated significant budget resources, and instructed the education system to implement a "High-Tech Matriculation Index."

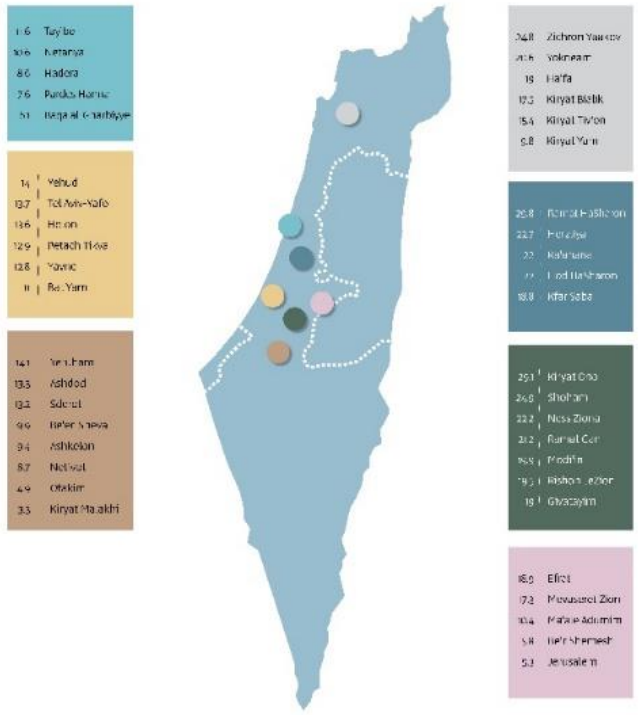
The Cities of Excellence Network (Institute for Local Government, Tel Aviv University) publishes the "Israel Excellence Map" annually, which previously included mainly data on five units in mathematics. In light of the government decision, the network expanded its database to include high-tech matriculation data from 2012 to 2022. The data is presented for approximately 230 local authorities across Israel, allowing local decision-makers to obtain an overview and use it as a tool for formulating action plans. The findings are published on a dedicated website and were analyzed and presented at a special conference attended by the Minister of the Interior and city mayors.

Main findings

1. In 2022, the number of high-tech matriculation graduates in Israel increased to 13,720 students, representing 11.3% of high school graduates. The number of five-unit mathematics graduates that year was 21,156, which constitutes 17.4% of high school graduates.
2. While there is gender equality in five-unit mathematics (50.1% female students), the percentage of female students in the High-Tech Matriculation Index is only 40.6%. This lower percentage is due to the gap between male and female students in physics and computer science tracks.
3. The findings indicate significant gaps between the center and periphery. The percentage of students with a High-Tech Matriculation is very high in municipalities in the center, for example: Ramat HaSharon (29.8%), Kiryat Ono (29.1%), and Herzliya (22.7%), compared to the periphery such as: Ofakim (4.9%), Kiryat Malachi (3.3%), and Jisr az-Zarqa (2.6%).
4. However, there are peripheral local authorities that, with considerable effort, have managed to exceed the national average, such as: Sakhnin (22%), Yarka (16%), Arad (14.6%), Yeruham (14.1%), and Tayibe (11.6%).

What are your children's chances of working in high-tech?

Tech-Matriculation Index



*Rate of eligible students

Workers' Skills in Israel: A Temporal Perspective

Yotam Margalit, Zak Hirsh, The Israel Democracy Institute

The industrial and technological revolutions are changing the landscape of the job market worldwide. The demand for workers is shifting, along with the types of tasks required for jobs, specializations, and in training. The pace of change in the type of job tasks is increasing, while education and training systems evolve slowly and struggle to keep up. As a result, gaps arise between the skills of workers and what is needed in the job market. Research on this gap is conducted worldwide using various methods, all concluding that while most jobs previously required physical, manual, and repetitive skills, today there is a demand for interpersonal skills and creativity that requires knowledge and cognitive skills.

A team of researchers at the Israel Democracy Institute aimed to examine this issue with a specific focus on the Israeli job market in recent decades. Efforts were made to identify the main points of discrepancy, with a look at various population groups in Israel. Special attention was given to developments in the high-tech industry, which holds a very dominant position in Israel. The research method relied on an analysis of large datasets from the Central Bureau of Statistics, as well as a comprehensive employee survey in Israel that provided an updated and in-depth picture.

Main findings

1. The skills most required in the Israeli economy today are interpersonal (such as interpersonal communication, verbal expression, and flexibility). There is a trend of increasing intensity of cognitive tasks (such as problem-solving ability and analytical skills), alongside a significant decrease in the need for physical, repetitive, and non-repetitive skills.
2. As the researchers put it: "The changes between 2001 and 2022 are equivalent to adding 190,000 engineers to the workforce, while subtracting 220,000 garbage disposal employees."
3. The research findings confirm the great importance for high-tech workers in Israel of the skills measured on the PISA test . These skills were also found to be very important for other workers in the economy, especially for those with academic education.
4. Many workers noted that proficiency in English is an important requirement for performing their job, yet simultaneously declared that their proficiency in the language is below what is required. This gap also exists among workers with academic qualifications.
5. A significant negative correlation was found between the level of religiosity and skill levels, particularly in English. Among the population groups in Israel, the ultra-Orthodox community has the highest skill gaps across all areas compared to other groups in the economy.
6. Researchers note that artificial intelligence is already beginning to change the skill set necessary for workers. Among large employers, AI skills are already ranked first among the needs for employee training. Researchers anticipate an increasing importance of interpersonal skills

Analysis of the Achievements of Israeli Students on the 2022 PISA Mathematics Test

Alik Palatnik, Nadav Marko, Vered Gavrielov, and Iman Karmi, Hebrew University of Jerusalem

The PISA assessment is a key barometer for assessing students' preparedness for the world in the 21st century. Eighty-two countries took part in the 2022 PISA assessment. The main focus of the exam, explored through in-depth questions from various perspectives, was mathematics. The exam is based on a representative sample; in Israel, 6,251 fifteen-year-old students from 193 schools participated, reflecting the general population of Israel.

On PISA assessments, each participating student answers two sets of questions (chosen from mathematics, reading, science, and creative thinking questionnaires) over a span of two hours. Additionally, for another roughly half hour, they answer a series of background questions (attitudes, learning experiences, etc.). Some questions are multiple-choice, while others are open-ended. Over the years, more of the grading is being carried out by computers, and the selection of tasks for each student is adaptive based on their performance up to that point.

The Hebrew University proposed to delve deeper into Israel's PISA assessment results, focusing on the performance of students who reached the top performing levels (5-6) in mathematics. The raw item data was analyzed and compared with that of several other countries. The research also included a PISA simulation with 12 female students (secular, Arab, and ultra-Orthodox), followed by interviews to understand how they handled such tasks.

Main Findings

1. Israeli students who excelled on the 2022 PISA mathematics exam comprised 8.4% of test-takers, placing Israel in 22nd place among the participating countries (an improvement of nine places since the previous exam in 2018).
2. The group of top-performing students (Level 6) in mathematics grew from 2018 to 2022 by 20%.
3. The mathematics areas in which Israeli students excel relatively are "quantity" and "change and relationships." The areas where they struggle the most are "space and shape" (geometry) and "data and uncertainty" (statistics).
4. Israeli students perform better on multiple-choice questions, and struggle with open-ended questions graded by a human evaluator. Israeli students are significantly more likely to skip open-ended questions and have particular difficulty in the mathematical modeling phase.
5. Interviews with the female students who participated in the PISA simulation revealed the following:

- Top-performing students not only demonstrated advanced mathematical knowledge but also had systematic work habits: re-reading the text without skipping, technological proficiency, using draft paper, switching quickly between paper and calculator, and between estimation and exact calculation.
- The most challenging topic for the students, also for the top-performers, was geometry. They struggled with unfamiliar questions (e.g., arranging pictures based on a data table, word-heavy multiple-choice questions, and open-ended questions that required reasoning).
- Arab students had particular difficulty with the text, describing the language as "strange," and faced fundamental misunderstandings of the text. Only after the question was explained were they able to handle the tasks. Ultra-Orthodox students struggled a great deal with the technology interface, and their transitions between tasks were not smooth.

Gender Gaps on the 2022 PISA Assessment

Rami Benbenishty

After several years of improvement, the 2022 cycle of the PISA assessment indicated widening gaps between the achievements of female and male students in mathematics. In only three developed countries did female students outperform male students (Finland, Norway, and Slovenia). Regarding the level of excellence in mathematics, in all countries worldwide, male students outperformed female students. Israel reached the fourth (and not esteemed) place in terms of gender gaps in the level of excellence in mathematics (after Macau, Hong Kong, and Japan).

In Israel, 11.8% of male students reached the top level of excellence in mathematics on the 2022 PISA (compared to an OECD average of 8.7%, and 10.5% among male students only). In comparison, only 4.9% of female students in Israel reached this level (compared to 6.8% of female students in the OECD). The largest gender gaps in Israel were recorded in state-religious schools, where 18.5% of boys reached the level of excellence in mathematics, as opposed to only 4.3% of girls.

To dive deeper into the data and identify difficulties and potential causes for the gap earlier in the process, we consulted Prof. Rami Benbenishty of The Hebrew University and Eli Kleinberger, also from The Hebrew University, who specializes in statistical data analysis. We asked them to perform advanced analyses and cross-referencing between questionnaires and test items. We attempted to identify specific mathematical topics where female students face greater challenges or lower success rates, aiming to uncover unique thinking processes characteristic of female students. We also examined whether there is a correlation between responses on social and emotional topics in the questionnaires and mathematical performance among female students.

Main findings

1. In Israel, male students excel on the PISA mathematics test at a rate over 2.5 times that of excelling female students. In general, this large gap exists across all tested mathematical topics and required mathematical thinking processes. No specific topic or process could be identified in which female students particularly excel or struggle relative to the general gap.
2. The smallest gender gap is in the fields of algebra, statistics, and probability, while the largest gender gaps were recorded in quantitative thinking and geometry. In terms of mathematical thinking processes, the smallest gap was observed in transitioning from the mathematical world to the real world (interpretation and evaluation), whereas the largest gap appeared in transitioning from the real world to the mathematical world (modeling).
3. The research showed that in Israel, many male and female students chose to skip test questions, especially at higher levels. They opted to skip these questions either

because the specific question was particularly challenging or because they became fatigued with this type of test item and decided to give up. The most significant rate of abandonment among both genders was in algebra, while the lowest was in quantitative thinking questions.

4. From a gender perspective, it was found that in the Jewish sector, female students skipped questions at a higher rate than male students, while in the Arab sector, the situation was reversed (consistent with data indicating a very low gender gap in excellence in the Arab sector). Arab male students skipped relatively more questions that required interpretive and evaluative thinking skills (transitioning from a mathematical solution to real-world meaning).
5. No correlation was found between female students' responses on questionnaires regarding their emotional and social conditions or their learning experience in the classroom and school, and their rates of excelling in the mathematics assessment. Jewish male students who excelled, reported a high level of attentiveness to what the teacher said in class and of persevering, trying to understand the material even when they did not initially grasp it.

Middle School Mathematics Curriculum - Theory and Practice

Niza Sion

In recent years, Israel's middle and high school mathematics curricula have undergone several changes. Some of these changes stemmed from deliberate and systematic policies by the Ministry of Education, others from gradual adjustments to the examination frameworks, and some arose from challenges and constraints brought on by the COVID-19 pandemic and the Swords of Iron War. At the same time, mathematics curricula worldwide are undergoing significant changes owing to technological advances and the skills now required for the job market. To some extent, these global shifts also impact the mathematics curriculum in Israel.

Niza Sion, a former national mathematics teaching instructor for Israel's Ministry of Education, thoroughly examined these developments. She analyzed the official curriculum and compared it to the guidelines provided to mathematics teachers in Israel. Sion also explored how changes in the high school curriculum impacted the middle school program; the influence of the conceptual framework of the PISA exam; and, the real-life effects of the cancellation of the Meitzav achievement exams, the Corona pandemic, and the war.

Main findings:

1. The middle school mathematics curriculum is divided into three main sections: Numbers and Operations, Algebra, and Geometry. The curriculum is taught in 7th through 9th grades, with approximately 150 hours of class each school year.
2. Following changes to the high school curriculum, adjustments were made to the middle school curriculum, including the addition of topics, such as coordinate geometry and properties of functions as an introduction to calculus.
3. However, due to the war, the Ministry of Education narrowed and reduced the scope of the material. Topics removed from the curriculum included functions, statistics, probability, word problems, and some geometry topics. This has led to significant gaps between the curriculum and its implementation.
4. The curriculum emphasizes the importance of incorporating literacy-based problems ("literacy tasks will be integrated into every learning unit where possible"), yet there is a mismatch between the mathematics topics and their weight in the curriculum versus the conceptual framework of the PISA assessment.
5. For example, the geometry curriculum focuses on plane geometry and drawing conclusions based on theorems, justifications, and proofs, whereas PISA emphasizes spatial geometry and applied geometry.
6. PISA assigns significant importance to statistics and probability, reflecting their prominence in the modern world. However, these topics are marginalized in Israel's mathematics curriculum.
7. The external middle school assessment system (Meitzav) was canceled. A triennial sample-based replacement was planned, but its implementation was postponed due to the war. Meanwhile, the Ministry of Education has offered schools internal assessment tools until the national model is implemented.
8. In middle school excellence classes (Amat, or "Scientific-Technological Reserve" classes), the focus is on deepening knowledge at the expense of enrichment, with emphasis on motion problems, literacy-based questions, properties of functions, and advanced geometry problems.

Experiment in Integrating Social Projects into Excellence Classes

Dalit Stauber

The main activity of the Trump Foundation in middle schools focuses on expanding the circle of excellence in mathematics and science education. Since 2018, the foundation has concentrated on developing approximately 600 educational tasks aligned with the conceptual framework of PISA, training 1,700 teachers to teach the new task content, and opening about 250 additional excellence classes across the country.

Alongside this effort, the foundation sought to conduct an experiment in integrating social projects into excellence classes. Four objectives were set for this experiment:

1. Gaining practical experience in applying mathematical skills defined at levels 5-6 of PISA's mathematics framework.
2. Utilizing skills defined by the Education 2030 framework which are not measured by the PISA assessment, such as teamwork, communication, and presentation.
3. Increasing students' motivation to study in excellence classes by demonstrating the practical use of mathematics in addressing real and important problems.
4. Creating a sense of "scientific leadership" among excellence students and fostering understanding among the public that Israel's circle of excellence has a social and ethical mission.

Through a portfolio of six programs operating in 60 classes across the country, the foundation experimented with various methods used in both formal and informal education. These programs incorporated projects where students in excellence classes utilized their mathematical and scientific knowledge to tackle social, community, and environmental challenges.

The initiative was documented and evaluated by Dalit Stauber, former Director General of the Ministry of Education, so as to examine whether and to what extent the stated goals could be achieved and whether and how the Ministry of Education could take on these activities over time and on a broad scale.

Main findings

1. Generally, the programs were enthusiastically received by the students. Problem-based learning (PBL) accompanied by consultation with knowledge experts is an important learning method, which unfortunately is not widely practiced in the Israeli education system. This approach proved its value in developing creative thinking, sparked interest and engagement, and allowed for a productive and creative learning process. Most students chose to focus on social challenges, and the research stages exposed them to hardships that elicited sensitivity and empathy. The students noted that emotional involvement was significant for them and created motivation to apply their talents toward social goals.

2. Alongside the great importance of fostering entrepreneurial thinking and its contribution to 21st century skills, a well-known tension (commonly seen in industry) emerged between the goals of product-focused thinking (mainly efficiency, speed, and feasibility) and the intellectual goals set by the foundation in the field of mathematical excellence. In most cases, the excitement and the playful nature of the design and production processes, as well as quick rewards overshadowed the intellectual aspect, shifting the focus towards entrepreneurship.
3. Due to many logistical challenges within the education system, exacerbated by the security situation, some programs had to forgo assessing participants' mathematical abilities, and thus did not focus on developing creative mathematical thinking but rather used mathematics as a practical tool for problem-solving. In the programs involving Mofet Excellence Class students or students from science excellence classes, a high level of creative thinking and intensive use of mathematics and physics was demonstrated.
4. Nevertheless, in all programs, academic advisors embedded modeling skills in an attempt to optimize participants' abilities, in line with PISA's objectives.
5. Across all programs, it was found that the vast majority of mathematics and science teachers were not accustomed to creative thinking, adhered to "safe" practices, and discouraged students from making mistakes as part of the learning process. This professional deficiency significantly limited their ability to foster critical thinking and challenge students to use mathematical knowledge creatively.
6. All programs showed improvements in teamwork, time management, and presentation skills, but no development of dialectical thinking was identified.
7. None of the programs used measurement and evaluation tools, relying instead on basic feedback practices. Indication of the improvement trend was based only on a gut feeling.
8. The foundation's experimental initiative, across all programs without exception, demonstrated that it is possible to conduct a fascinating and challenging learning process that strives for excellence while also promoting engagement, enthusiasm for science, joy of learning, and the development of intellectual and emotional national benefit of such a program. However, it is clear that managing complex learning processes on a national scale requires development and logistical resources that only the Ministry of Education can provide.
9. If the Ministry of Education determines that the model developed by the foundation and its partners is suitable for nationwide implementation, in order to promote mathematical and scientific excellence among middle school students, professional support can be provided along with the development of a structured method for managing the process. The development must include definition of requirements for the program operators, including creating the necessary adaptations for the different sectors of Israeli society.
10. It is recommended that the Science and Technology Administration be involved, as it possesses the capacity to allocate teaching hours to this program in excellence classes, and to allow principals to choose the organizations that meet the professional requirements through the Gefen program (provides flexible, discretionary budgets for school principals and local authorities to implement educational goals).

To the full report

Educating for Artificial Intelligence - National Programs and International Standards

Ronit Halstuch, Weizmann Institute of Science

Already a number of years ago, pioneering countries around the world began to execute comprehensive changes to their education policy in order to prepare for the era of artificial intelligence. As part of their national programs for artificial intelligence, these countries defined a chapter dedicated to education. In consequence, they are taking significant steps related to curriculum changes, teacher training, and in the integration of advanced technologies, which are currently at varying stages of progress.

At the same time, international education organizations, led by the OECD, The International Monetary Fund, and UNESCO, as well as the US National Science Foundation (NSF), began to define joint professional standards for artificial intelligence education. These standards are intended to create a common platform which, in the coming years, will serve the experts and the countries in adapting their education systems to the different learning levels of students and their stage of education.

To learn from practice abroad, we turned to a doctoral candidate studying teaching of artificial intelligence, at the Department of Science Teaching at the Weizmann Institute of Science with a request that she review policy documents, national programs, and international standards and present an in-depth analysis and key insights.

Main findings

1. Countries around the world classify artificial intelligence literacy into three levels: a level of basic comprehension and use for all students (AI for all); a level of advanced comprehension and use (future scientists); a level of development intended to prepare those who in the future will develop artificial intelligence technologies (future developers).
2. According to international standards, at each one of the literacy levels, three areas of content must be distinguished: basics, skills, and ethics. Basics includes the understanding of "how a computer thinks and learns on its own"; skills include the use of artificial intelligence tools to address different problems; and ethics, which includes aspects of fairness, equality, privacy, transparency, and morals.
3. According to UNESCO's standards, three levels of skills must be distinguished: comprehension, application, and creation. For example, at the "basics" level, it is possible to be satisfied with an understanding of how artificial intelligence tools work, at the intermediate level, how to use them efficiently, and at the advanced level students must be able to develop AI tools on their own.
4. According to the OECD's Future of Skills project, in an era in which artificial intelligence can successfully solve the PISA assessment tests, "man's superiority to the machine" needs redefinition. The project recommends strengthening computational thinking, programming skills, and the literacy level for all students so that they will be able to evaluate, critique, and interpret the outputs of artificial intelligence.

5. The OECD recommends the integration of AI tools in science and mathematics subject areas which will prepare future scientists. Regarding future developers, the recommendation is that the science and mathematics curricula include topics of data science and machine learning as well as advanced facets of ethics and morals.
6. According to the International Monetary Fund, widening gaps can be expected on the basis of gender, education, age, and economic status and therefore, policy must emphasize giving special opportunity to those likely to be left behind.
7. The US National Science Foundation raises concerns regarding the ability of teachers to teach such advanced content and therefore recommends training and developing skilled teaching staffs.
8. In 2019, the Singaporean government established a national artificial intelligence program. Within its framework an educational organization named AI Singapore was created, which works together with the education ministry in building learning materials for use starting in second grade up to university. The material is taught in schools as part of both required and elective courses, in after-school science-oriented clubs, and as enrichment activities
9. In 2021, the education ministry in South Korea revised the national curriculum and developed learning materials for data science, machine learning, and the social implications of artificial intelligence. In regular high schools, a required course in artificial intelligence was added. In schools for the sciences, there is a requirement for a matriculation examination in advanced mathematics for artificial intelligence; diverse study tracks and elective enrichment courses are offered.
10. In China, already in 2017, the education ministry upgraded the high school computer science curriculum, integrating comprehension and application of machine learning, data analysis, and artificial intelligence. The program is mandatory but allows districts the flexibility to make adaptations as they see fit. In 2024, the program was expanded to primary schools and includes group learning which integrates AI tools. Teacher training was upgraded and all the teachers in the program are required to engage in ongoing professional development.
11. In the United States, beginning in 2018, professional organizations were established, such as "AI for K12" and "AI for All," which promote standards, development of learning materials, and teacher training. These undertakings were spurred by the Computer Science Teachers Association, and the bulk of their activities is funded by the NSF. The activities are not carried out under the auspices of the national federal policy.
12. In Canada, the core of the endeavor focuses on the area of the computer sciences through the "Actua" program developed in collaboration with Google, Microsoft, and the American "AI for K12" organization. It is a comprehensive program which focuses on data science and modelling and solutions to complex problems. Due to a shortage of teachers in the field, the program is conducted by instructors from professional organizations.
13. In England, the curriculum does not adhere to standards nor is there required content related to artificial intelligence. The National Centre for Computing Education (NCCE) is attempting to promote the field through development of

learning materials and offering them to secondary schools. Since the program is not mandatory, in practice, the materials are learned only in non-formal frameworks and enrichment courses.

What Do Excellence Students Need to Learn in the Era of Artificial Intelligence?

The Israel Academy of Sciences and Humanities

In the first quarter of the 21st century, the best predictor of becoming part of the Israeli science and high-tech fields in the future was studying in the high-tech matriculation track in high school, that is, matriculation that includes studies at the five-unit level in the subjects of mathematics, English, physics and/or computer science. However, significant changes have been made to curricula worldwide, as reflected in the PISA conceptual framework. These changes emphasize the skills needed in an era where computers perform tasks accurately and quickly, while people should focus on the abilities required to solve complex problems under conditions of uncertainty.

As we approach the artificial intelligence revolution, the question of "man's superiority to the machine" arises once again, and even more relentlessly. International bodies and many countries are confronting the question: What do students need to learn in school in an era where computers learn, think, and create on their own? For the Trump Foundation and its partners, the central issue focuses on what excellence students need to learn in school today in order to be prepared for future careers as scientists and developers, and what can be done to maintain Israel's status as a world leader in the fields of science and technology?

To take several steps in this direction, the foundation turned to the Israel Academy of Sciences and Humanities to convene a team of experts comprised of leading researchers and scientists in Israel. The team examined the knowledge and skills utilized in scientific research in the rapidly developing technology era. From this perspective, the expert team also reviewed the curricula studied in the excellence tracks and was asked to offer insights and directions for consideration.

The team of experts included: Michal Armoni, David Ginat, Amiram Yehudai, Talli Nachlieli, Raz Kupferman, Oren Kurland, and Shimon Schocken.

Main insights and recommendations

1. The team of experts distinguished between the needs of all students who require basic knowledge and skills to function well in the AI era ("AI for All," "AI Literacy") and the needs of students who have the option of advancing to a technology career and study in excellence tracks in high school and who, already at an early stage, need advanced knowledge and tools.
2. The field of teaching artificial intelligence is in its infancy and there is still no consensus regarding what should be taught and what the outlines of a relevant curriculum are. In Israel, this issue still does not receive the attention and resources it needs. Initial steps being taken in this country are in the field of computer science teaching and focus on basic aspects of data science and learning

through projects. Likewise, the rapid development of the field makes it difficult to predict the competencies that will be required of tomorrow's developers. As such, the team recommends focusing on teaching the foundations of the field and on the development of universal competencies that do not rely on a specific technology.

3. The expert team identified a critical obstacle in that there are almost no teachers in Israel who are capable of teaching the field of machine learning and artificial intelligence. An advanced training program for teachers will be required, which will include studies in programming, data science, linear algebra, and algorithms, alongside practical experience using materials provided for the students. There will also be a need to establish teacher communities of learning for the purpose of professional development.
4. The expert team recommends that the instruction of artificial intelligence in Israel be based on a data-centric AI approach which focuses on systematic work with data for the purpose of building a successful system using real life and "dirty" data.
5. In addition to knowledge and skills, emphasis should be placed on ways of thinking. The type of thinking excellence students need to engage in is analytic thinking, the ability to break down complex problems into components and identify patterns that aid in reaching solutions. Along with this, students will need to engage in critical thinking, computational thinking, teamwork, and possess a high level of English-language competence.
6. The expert team identified opportunities for gender parity in this area. While computer science is perceived as a male area of knowledge, data science is actually a neutral field from the gender perspective, perhaps due to the field's relevance to other diverse areas. The assessment is that teaching data science as an independent field, and not in the computer science framework, as is customary today, will contribute to gender parity.

Imparting Emotional Skills in Programs for Outstanding Students

Effective Research for Impact (ERI)

Many students can succeed in the excellence tracks, but for various reasons, they do not choose to study in them, or they drop out along the way. Some of this relates to emotional reasons which are tied to the students' mental resilience. Lack of such resilience can occur in both strong and competitive environments but is more prevalent in weaker environments with a dearth of options and encouragement for success. We sought to examine which social-emotional skills students with potential need to help them develop mental resilience, to allow them to choose and persevere in excellence tracks.

We turned to Effective Research for Impact (ERI), an organization that promotes social impact by harnessing research for the practical needs of social action. We asked them to conduct research that includes a research literature review examining which social-emotional skills are important to promote in programs of excellence in science. We also asked the researchers to identify science programs from around the world with proven best practices for imparting selected social and emotional skills to excelling students. We wished to know how these programs impart these skills, how they measure them, and whether there are common principles for action from which we can learn.

Main findings

1. From the list of skills required for outstanding students, five social-emotional skills were selected that are relevant to choosing excellence tracks and reducing dropout rates: perseverance, coping with heavy workloads and failure, self-efficacy and envisioning the future (with an emphasis on female students and disadvantage sectors), self-management (with an emphasis on time management and self-responsibility), and self-motivation (i.e., motivation and curiosity).
2. The ability to persevere develops best indirectly through experiential learning, utilizing a combination of ongoing experiences and long-term projects.
3. Envisioning the future is attained by the modelling of successful graduates who come from backgrounds similar to those of the students.
4. Motivation develops first and foremost indirectly, through experiences that arouse interest and success. Interest is created through a combination of exposure to current scientific topics alongside significant sensory experiences in laboratories using the latest research tools, or through simulations of virtual and augmented reality. Success is experienced through overcoming a challenging task tailored to the target audience, such as a project-related research assignment.
5. Self-efficacy is instilled by trying out modified tasks and experiencing non-trivial successes.

6. Curiosity can develop along two paths. The indirect route creates interest through exposure to topics and practical experiences, while the direct route fosters curiosity through focused training in the technique of asking questions, implemented in dedicated programs or within subject areas.
7. Self-management and time management can be instilled through direct practice. Since these skills occur in a context of concrete tasks, they can be integrated within a framework of lessons in science-technology subject areas.
8. The ability to cope with experiences of overload and failure, as well as perfectionism (at minor and medium levels), is imparted through specific practices based on psychological literature and research, such as CBT (Cognitive Behavioral Therapy) and CBM (Cognitive Behavior Modification).
9. Limited programs that focus on separated practices are suitable for the formal education system, while holistic programs that include diverse components are less appropriate.
10. It is particularly important to expose youth from under-represented populations to role models and practical experience that enable them to imagine themselves in an experience of success. The use of digital techniques can help make quality education available, especially in geographic peripheries of Israel.
11. Among the ten programs selected for the research, there was one program in which students acquired skills independently through the use of video clips and exercises for coping with anxiety and failure; two programs were taught exclusively by school teachers and focused on time management skills and the technique of asking questions to stimulate interest and curiosity; three programs were transmitted by combined teams of professionals (from academia, industry, and others) and teachers, addressing envisioning the future, developing curiosity and motivation; and, in four programs, the program staff was external, focusing on perseverance, time management, perfectionism, and motivation.

The Mental Skills Needed by Middle School and High School Students Studying in Science and Technology Excellence Tracks

Roni Gez-Langerman and Noa Albelda, Sagol School of Education Program, Reichman University

Development of mental skills is gaining increasing importance in various excellence tracks. Schools, too, understand that in order to expand choice, perseverance, and success in excellence tracks - in normal times, and all the more so following the Corona pandemic and the war - students need to acquire mental skills, and both teachers and students need to be instilled with a belief in their capability, willingness to invest, and commitment to making an effort.

We sought to examine which mental skills are essential for success in excellence tracks in middle schools and high schools, whether there are differences in the needs of students from the center and the periphery, Jews and Arabs, boys and girls, and whether there have been changes following the Corona pandemic, the ongoing war, and the artificial intelligence revolution. In addition, we wished to examine how programs to impart mental skills can be implemented in schools.

To answer these questions, we turned to the Sagol School of Education Program to conduct a research study that includes a comprehensive literature review and in-depth interviews with principals, teachers, and students.

Main findings

1. Excellence students especially need the following skills: self-awareness and emotional regulation, ability to pay attention and concentrate, critical and creative thinking, interpersonal communication and teamwork, time management and organizational abilities, coping with pressure and emotional resilience, a growth mindset, and independent learning skills.
2. Excellence students from all sectors experience difficulties similar to those of other students in their ability to pay attention, concentrate, and express themselves, apparently as a result of extensive exposure to social networks. In contrast to their peers and typical adolescent characteristics, excellence students are intentional and calculated, have a clear picture of the future, and often function in a more "robotic" and less emotional manner than their peers.
3. While in excellence classes in the center of the country, the students have high cognitive abilities, in the periphery, the classes are heterogeneous. Alongside high-ability students, there are students, and their parents, motivated by a desire to improve and excel, even though they may not necessarily have high cognitive abilities.

4. Education teams report differences between boys and girls in excellence classes. While boys tend to show high thinking skills and stand out, girls demonstrate perseverance and determination but express themselves less.
5. The pressure caused by the Corona pandemic and the Swords of Iron War affects students' social and emotional abilities, and can lead to a decline in academic achievements.
6. The use of artificial intelligence, like other activities in the digital space, creates a sense of isolation and reduces social interactions and thus, there is growing importance in imparting interpersonal and social competencies.
7. Some mathematics and science teachers are interested in receiving training in mental fields but are concerned they will not succeed in applying the tools due to the pressure to cover the study material. According to them, the advisory team should provide a solution, but they recognize that this is only a partial solution, and it is necessary to integrate mental instruction into the lessons. In parallel, most teachers of language-intensive subjects in excellence classes, along with homeroom teachers, expressed enthusiastic support, willingness, and motivation to learn the content related to mental skills and to transmit it to the students.
8. Programs in social-emotional learning must be organically integrated into regular lessons and expressed in the pedagogy of the subject-area teachers, and not only as separate supplemental programs. Additionally, teacher training programs should impart both theoretical-research knowledge, as well as practical tools.
9. It is important to create individual support systems for the excellence students that will include mentoring programs with teachers, graduates, or industry experts.

High-Tech as a Driver for Intergenerational Mobility in Israel

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Within just a few decades, Israel has emerged as a thriving startup nation, with high-tech representing over half of Israeli exports, a quarter of the state's tax revenues, and Israel ranking third in the world in the number of startup companies listed on the NASDAQ stock exchange. However, alongside the prosperity and growth of the Israeli high-tech sector, inequality has expanded, manifest in wage gaps, disparities in education, and differences in employee skill levels. The result is that Israel's high-tech sector, which employs about 12% of the workforce, is composed mainly of Jewish men from central Israel. For large parts of Israeli society, the "Israeli dream" remains just that - a dream.

Researchers at the Israel Democracy Institute conducted an extensive study to identify the pathways to economic mobility in Israel, focusing specifically on the conditions that enable employees from weaker economic backgrounds (the bottom income quartile) to integrate into the high-tech industry. The goal of the research is to promote policy measures that would broaden access to high-tech. The study, a longitudinal analysis based on a large dataset (about half a million men and women), examined parental income, ethnicity, education, residence, salary, and employment status.

Main findings

1. Only 5% of individuals who grew up in families in the bottom income quartile succeeded in integrating into Israel's high-tech sector. Even within this group, the representation of women and Arabs is particularly low.
2. Only 7.5% of those who grew up in households in the bottom income quartile possess higher education in fields relevant for work in high-tech (mathematics, science, and engineering). Degrees in other fields were not found to contribute to integration into the high-tech industry.
3. For Jews from the bottom quartile with relevant higher education, the likelihood of integrating into high-tech is the same regardless of whether they come from Sephardic or Ashkenazi families, or from the former Soviet Union.
4. There is a strong correlation between the number of mathematics and English units studied in high school and the likelihood of integrating into high-tech. The transition from 4 to 5 units is the most significant factor.
5. However, the strong correlation between education and employment in high-tech is far less significant when it comes to Arabs and women: A Jewish individual from the bottom quartile is five times more likely to integrate into high-tech than an Arab individual with the same background and education. A man from the bottom quartile is 1.5 times more likely to integrate into high-tech than a woman with the same background and education.

How to Encourage Women to Choose Excellence Tracks Leading to High-Tech?

Aaron Institute for Economic Policy

Women make up only about 35% of the Israeli high-tech sector (20% in R&D positions). This gap is already evident in the education system. In middle school, female students represent 30% of the top performers on the PISA mathematics assessment. In high school, they make up about 40% of students in high-tech matriculation programs (a package consisting of five units in math, English, physics, and/or computer science). In the military, women hold only 14% of advanced technological roles. At the university level, women constitute 25% of graduates in high-tech fields (engineering, math, and computer science).

The Aaron Institute for Economic Policy aimed to investigate the reasons behind the gender gap at key decision points from middle school through to employment. The Institute's researchers analyzed data sets to identify trends and changes over the years and conducted in-depth surveys with female students in middle school, high school, military service, university, and women working in high-tech.

Main findings

1. Studying in an excellence class in middle school was found to be the most significant predictor and springboard for integration into high-tech at all subsequent stages. The primary reason for not choosing an excellence class or a specialization in physics or computer science in high school is the absence of such classes or specializations in the school.
2. Of male students in excellence classes in middle school, 45% reported that their elementary school mathematics teacher recommended that they enroll in the excellence class, compared to only 17% of female students.
3. Among male students, 68% indicated that the end goal of their studying in an excellence class in middle school was to join a technology unit in the military, a science track in high school, engineering studies at university, and/or work in high-tech, compared to 48% of female students.
4. No gender differences were found regarding the importance of mathematics and science studies. Additionally, no differences were attributed to ability differences between boys and girls, nor in the perception of the challenge level in excellence tracks or in the social and emotional aspects related to learning in these tracks (belief in oneself, motivation, self-confidence, competence, friendships).
5. Female students in excellence and high-tech matriculation programs are more likely (52%) to participate in additional extracurricular activities (youth movements, academic programs, and various extracurricular activities). Thirty-five percent of them participate in science and programming clubs, compared to only 12% of male students in excellence classes.

6. The potential among male students is close to being realized. Eighty percent of male students studying five units of mathematics and English also study physics and/or computer science, compared to 55% of female students. Twenty percent of female students in physics or computer science tracks study only 4-unit mathematics.

7. In schools with a high percentage of high-tech graduates, gender gaps are larger. In schools with more than 15% high-tech graduates, the gender gap is over 50%. In contrast, schools with less than 10% high-tech graduates show almost no gender gap.

8. Among Hebrew-speaking families, parents with higher education levels tend to encourage and push their sons to study in excellence classes and high-tech matriculation programs at twice the rate compared to their daughters. In contrast, among Arabic-speaking families, there is no gender gap in this regard.

9. Students who completed high-tech matriculation in high school have a very high probability of enrolling in high-tech degrees at university. However, male high school graduates with high-tech matriculation are twice as likely to enroll in high-tech degrees at university, compared to female graduates.

10. Women who completed high-tech matriculation in high school will earn an average salary 25% higher than those who completed matriculation with five units in chemistry or biology combined with five units in mathematics and five in English. The proportion of female students with matriculation in chemistry/biology combined with mathematics and English is 75%, whereas the proportion with high-tech matriculation is 40%.