THE EDDIE & JULES
TRUMP FAMILY FOUNDATION
קרן טראמפ

Strengthening the Foundations of Excellence in Middle School Studies of Mathematics and the Sciences

2021 Update I In the wake of the COVID-19 crisis

The global COVID-19 crisis has underlined the great importance of mathematics and the sciences for our lives. Formulas and models flood our screens and help us making sense of the situation. Scientists and physicians are the heroes of our era, as human society awaits the development of a cure and a vaccine. Along with the difficulties of this period, it can also be a time of opportunity for education, when students become more motivated to study mathematics and the sciences.

Indeed, at this stage of the crisis, and against all odds, a minority of students are successfully learning mathematics and the sciences at a high level. They are paving a way forward, while the education system is mired in turmoil and many students are falling further and further behind. These excelling students demonstrate qualities of independence, flexibility and persistence - skills they will also require in the future, in their employment and adult lives.

We therefore believe that such excellence, particularly in the areas of mathematics and the sciences, should catalyze a chain reaction, and provide purpose and meaning for both teachers and students in these difficult times. It is now even more important to help additional students to advance and build competencies. The message is clear - those who now quickly adjust and take responsibility for their learning will be able to emerge from the crisis at a better starting point.

In 2019, we launched a New Roadmap for Middle Schools. We identified excellence in mathematics and its scientific applications as a ladder that many students can use to climb higher. We designed a philanthropic program aimed at raising the level of excellence in these fields in middle schools. The program, based on a strong need for collaboration, is intended for any student who is ready to take on this challenge.

In the first stage, outstanding researchers from universities and from education organizations began to build a rich database of challenging learning materials. These learning tasks, which draw their content from real-life contexts, express applied mathematical reasoning at a high level. Working together with teachers, professional communities are being formed in which they are jointly developing methods of instruction for these materials.

In parallel, local authorities, school networks and education districts are opening additional excellence classes in middle schools that use the new materials. In discussions with professional echelons at the Ministry of Education and with a broad cross-sectorial coalition of stakeholders, cautious steps are now being taken to raise the level of applied mathematical thinking and to incorporate it as one of the components in the curriculum.

Now, after two years of work, the foundation's International Advisory council will convene. The Council will analyze the progress, discuss changes stemming from the COVID-19 crisis, identify opportunities and assist in addressing the challenges. The Council's meetings will be open to all of our partners and critics in order to encourage joint dialogue and provide feedback, critique and insights for improvement.

This is an important opportunity for us to thank our partners for enabling us to join you in this important journey. We regard it as a great privilege to listen, learn and offer our support. We need your professional perspective in the shadow of the crisis. From our shared experience, we know that our connection will enable us to overcome difficulties and to pave the way together towards our shared success.

The Trump Foundation team

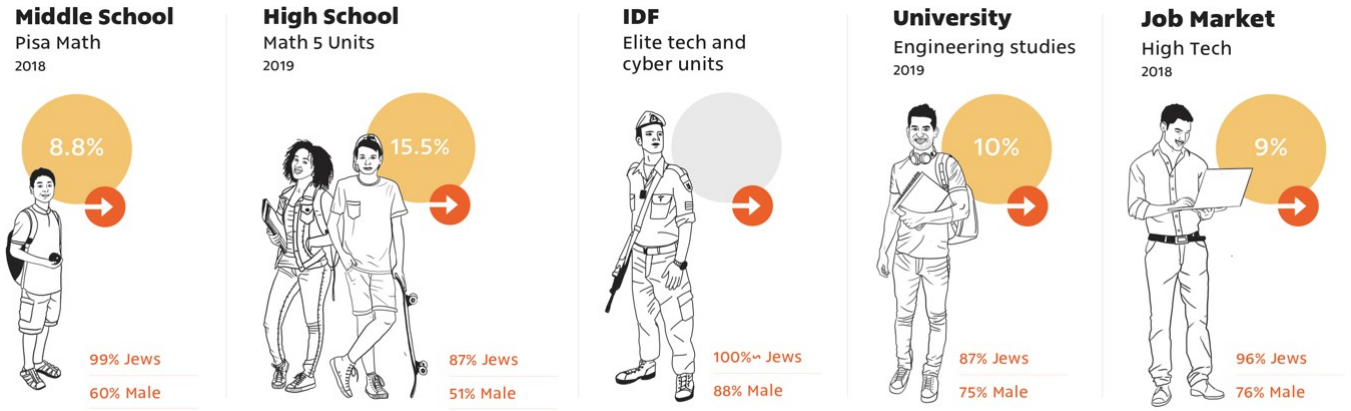
November 2020

Starting Point | 2019

Israel has an informal 'funnel' that promotes excellence in the fields of mathematics and science. The funnel begins when students choose to study in “classes of excellence” in middle school. Many of the graduates of these classes continue on to the highest level in mathematics (five units) in high school, and from there to the IDF’s elite technological units, to university engineering departments and on to careers in high-tech, science and medicine.

There are two main problems with this tunnel: first, Israel’s excellence funnel is too narrow and uniform. Only about 9% of Israel’s students participate in this flow of excellence, and most of them are male Jews from central Israel. The challenge already begins in middle school, where there are very few classes of excellence. The entry to these classes is at the end of elementary school, and the doors are usually closed to those who would like to join at a later stage.

In recent years, this path of excellence has begun to open. Following a national effort targeting students of high school age, the percentage of students taking five units in mathematics has increased to more than 15%. About half of these students are female, and many of them are from the periphery and from the Arab sector. This is a first step toward addressing the problem, and its impact is starting to be felt in both universities and middle schools.



The second problem with Israel's excellence funnel is that at its entrance – in middle school – the level of study is not sufficient. The gaps in knowledge and skills between middle school and high school make it difficult for students to transition from middle school to the five unit classes in high school. This difficulty is expressed in gaps in the levels of mathematical thinking and application, and in the ability to handle complex mathematical problems.

The primary effort in middle school is however to build a solid base of knowledge and technique in mathematics, and to gain broad exposure to a range of scientific subjects. Mathematics and the sciences are studied separately; mathematics is taught with almost no authentic context and science is taught without applying advanced

mathematical tools. Consequently, even students who acknowledge the importance of these fields, tend to lose interest and find little challenge in them.

The PISA research adds another dimension. The PISA research, which assesses skills that are essential in the 21st century, indicates that middle school graduates in Israel do not effectively apply their mathematical knowledge. Only 9% reach the international accepted standard of excellence. This means that while the education system succeeds in teaching (via five unit classes) the abstract thinking required for university studies, it is still struggling to teach the applied skills needed for employment and adult life.

COVID-19 Crisis | 2020

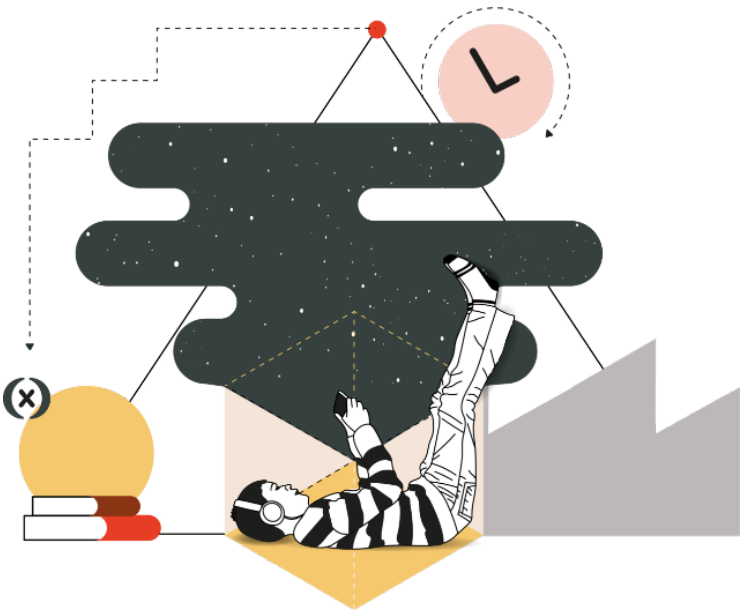
Since March 2020, the world has been immersed in an ongoing crisis and it is still impossible to assess its impact on education. Clearly, the crisis will be with us for some time. The current generation of school students is already paying the price by falling behind in their educational, social and emotional development. However, the long-term implications for them in terms of higher education and employment are still unclear.

The roadmap we outlined in 2019 for middle schools has been directly and indirectly affected by the crisis. Several aspects have slowed down and contracted, while others have accelerated and intensified. All this is happening simultaneously and rapidly, while it is still doubtful which developments are transitory and which will remain for years to come. This presents challenges, but also offers opportunities:

Challenges

Public education is shrinking. The formal education systems are trying harder, but the children are receiving less. Naturally, education systems are focused on logistics and health measures, working under tight constraints and frequently changing guidelines. In middle schools, an extraordinary effort is now required in order to open additional classes of excellence, to incorporate innovative study materials and to mobilize the teachers for building professional capabilities.

Gaps are widening. Rapid fluctuations between closures, distance learning and partial opening of schools has disrupted the routine of learning. Teachers are reporting that the scope, pace and depth of teaching and learning are suffering. There are teachers and students who are managing to make good progress, but many others are lagging behind and the



disparities between students are growing, especially in middle schools and in the periphery.

The traditional role of teachers is diminishing. When studies shifted from the classroom to the home, there was an expectation of educational continuity. The initial inclination was to take the same classroom teaching methods and replicate them on the Zoom platform. However, outstanding teachers quickly realized that a different type of instruction was now required, with other methods and timeframes. Nonetheless, many middle school teachers are still trying to acclimate to these changes and frequent transitions.

Opportunities

Public awareness of the importance of mathematics and the sciences is growing. Mathematical models are helping us understand the current developments. Technological and communication tools are instrumental in this effort and the entire world is looking toward excellence in these fields to bring a cure for this disease. This extraordinary situation presents an opportunity to create motivation and impetus for excellence in science education.

Skills required for learning converge with skills needed in real life. Students who are managing to learn well during this period are those who demonstrate personal responsibility, self-discipline and cognitive flexibility. In this way, they are successfully contending with the complexity and uncertainty of the situation. These are essential skills for learning today and are the same skills that manifest in the PISA framework. They also characterize the world of work and life that awaits the students in the future.

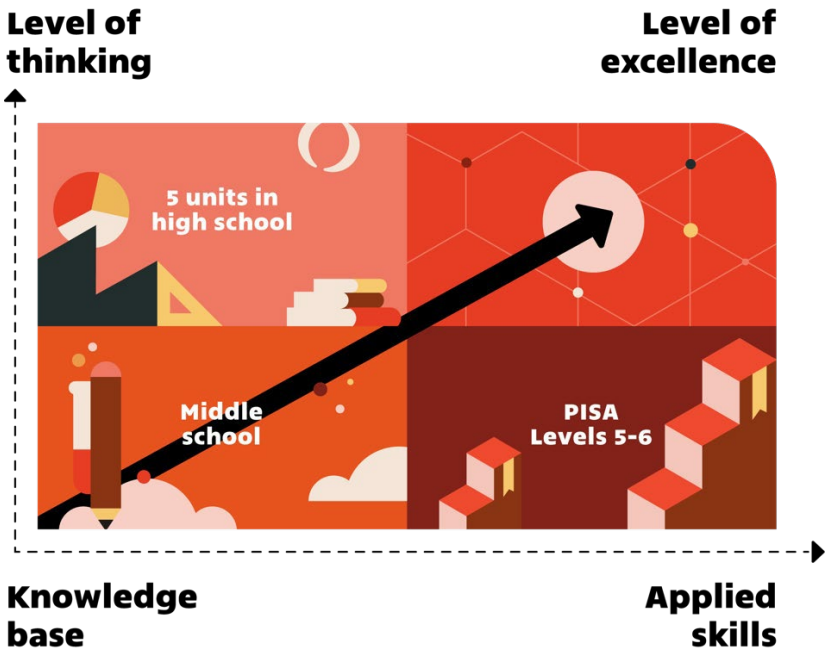
The role of technology in education is on the rise. Before the crisis, technology was not a significant catalyst for systemic improvement in education, but has now become essential for enabling the education system to function, especially at the secondary school level. While the availability of telecommunication and end-user devices is critical, digital learning materials, assessment tools and pedagogical methods are now driving the change in the roles of student and teacher.

Immediate response

When the schools were shut down, we decided, in consultation with our partners, to make every effort to continue with our joint roadmap, while adapting to the conditions of the changing reality and responding to immediate needs. In early April, mathematics contests and quizzes were organized, using the context of the pandemic to engage students in mathematical modeling. Tens of thousands of students participated from their homes via television, internet and social networks.

Since the beginning of May, under the leadership of the Ministry of Education and together with education organizations, learning management systems have been deployed to enable mathematics teachers to address each student individually. Dedicated communities of teachers have been formed to support the implementation of distance learning, and learning tasks have been developed by teachers in the context of the pandemic that make use of advanced mathematical models.

Dozens of high-tech professionals whose workplaces closed during the pandemic began training in June to become teachers of mathematics and physics. In an initiative led by the Union of Local Authorities, together with the Technion and high-tech companies, online courses for students were offered during the summer vacation. Thousands of students participated in these summer camps with the aim of catching up on material and strengthening their readiness for studies at the five-unit level.



Updated “theory of change” for the post-COVID era

Since the beginning of the 2020-2021 school year, our efforts have been focusing on helping students, teachers and the education system to prepare for “the day after” the crisis. We believe that in a time of closure and slowdown, those who make an effort will not sink; those who are determined and creative, and who develop capabilities for the future are the ones who will emerge from the crisis with a relative advantage.

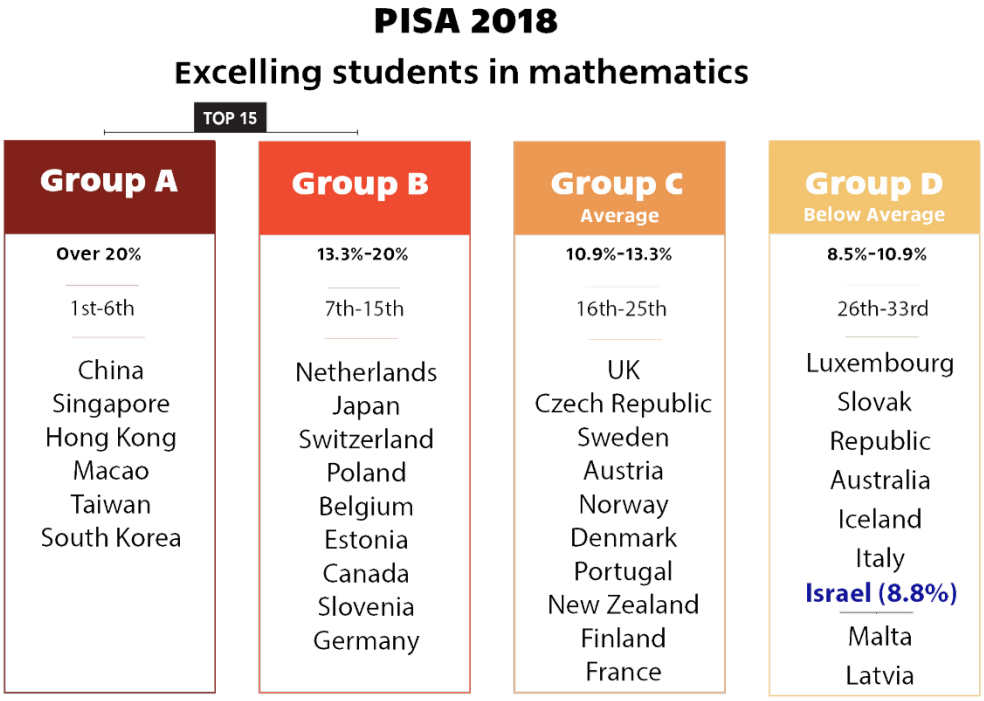
The crisis is strengthening the public’s awareness that in the 21st century, excellence in mathematics and the sciences will be essential for contending with the critical problems of humanity. Therefore, we aim to create a deeper connection between the content studied in school and real life, while raising the level of thinking and implementation and extensively expanding the ranks of excellence, welcoming any student ready to take on the challenge.

The operating system of teaching and learning is swiftly changing. We are witnessing a quick acceleration of a process that is transforming teachers from those who impart knowledge to those whose role is to support, from near and far, the learning of each individual student. The students' self-motivation and individual responsibility for their learning are becoming the cornerstone of study, with a growing role for independent and peer learning. The traditional boundaries between home and school and between formal and informal education, are blurring.

Programs

In the wake of the COVID-19 crisis, the weight of responsibility for learning is shifting to the students. In order to (1) maintain a focus on learning, they will need skills that enable them to independently deal with complex problems in conditions of uncertainty and to remain motivated, curious and interested. For this, when learning at home, they will need digital platforms, as well as pedagogical and emotional support from adults and peers.

For such learning, in the classroom and at home, it will be essential to (2) develop challenging learning materials. Therefore, the materials that are now being developed by top experts in academia and in education organizations are directed toward high-level mathematical reasoning and the application in science of advanced quantitative models based on real life contexts. The successful use of these materials will be measured by Israel achieving a top-15 ranking of excellence in the 2028 international PISA research.



These materials will reach the classrooms when teachers are convinced of their importance. Therefore, we are helping teachers to (3) jointly cultivate ambitious teaching. The goal is to achieve a high level of instruction that leads the students to successfully tackle complex mathematical tasks. With this objective in mind, we are working to form professional learning communities of teachers, in which they learn from each other and hone their expertise.

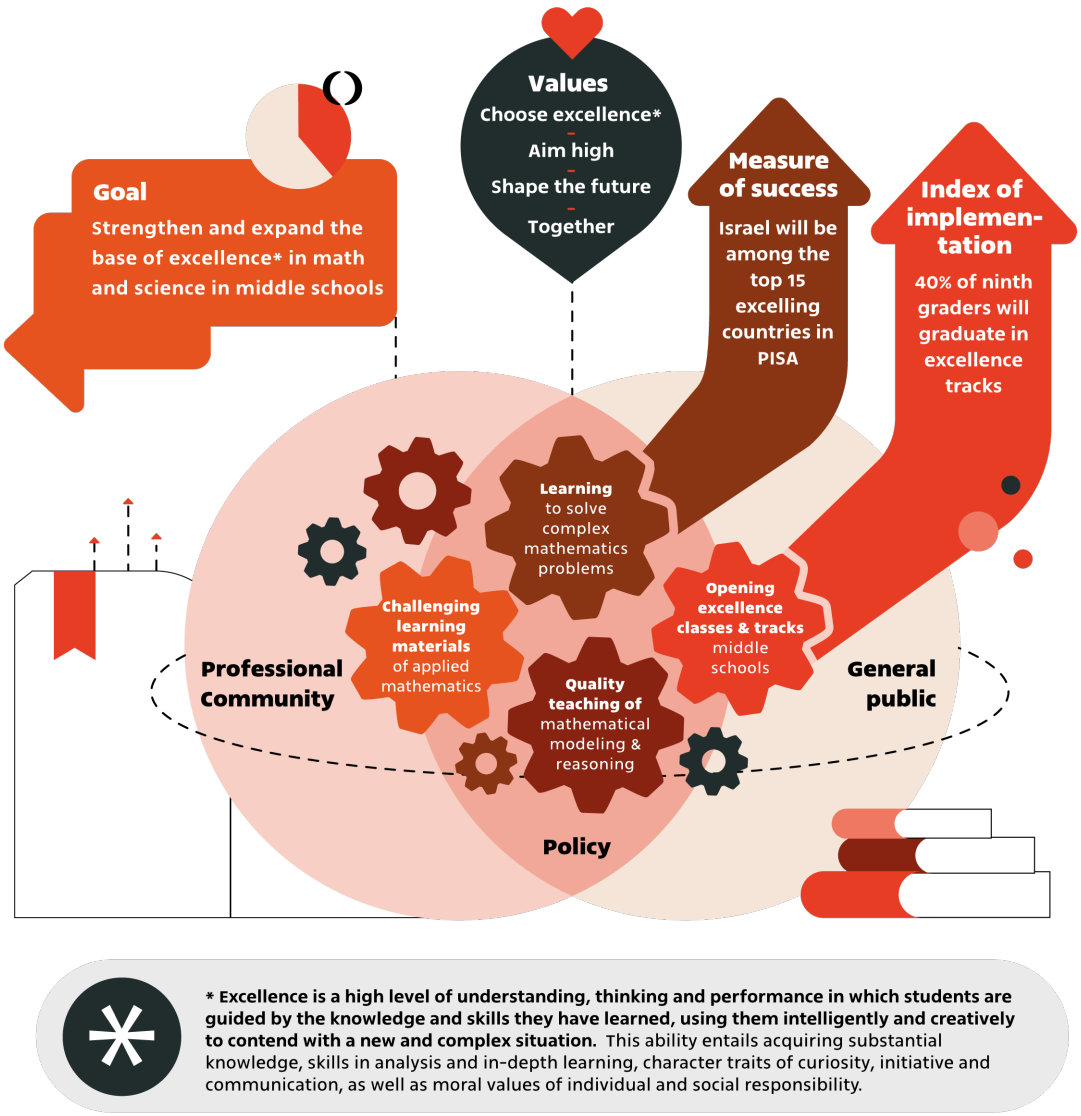
Quality materials and well-trained teachers are a necessary condition for expanding the ranks of excellence. Thus, we are building partnerships with the local school systems to encourage the (4) opening of new excellence classes in middle school. These classes are designed to enable every student to be ready for the challenge of studying mathematics and the sciences at a high level. The goals is for about 40% of ninth graders to complete middle school in classes of excellence.

In order to meet the goals outlined in these efforts, they will have to be coordinated and synchronized. For this to happen, we believe that support and reinforcement will be needed from three systemic circles of influence. In these circles, we will be stimulating discourse and mobilizing partnerships in order to create a common language, as well as an impetus for movement and collaboration:

Igniting public momentum. Students and their parents are the beneficiaries of our activity. They are already convinced of the importance of five units in high school as a key for the future. Now we need to convince them that this future begins in middle school. We see that parents are looking for a prestigious track that will boost their children onto a path of success. The students are also interested in such a track and emphasized that they wish what they learn in school would help them in their future lives and that they prefer to learn together with friends.

Convening a professional network. Over a decade ago, many countries were already studying PISA's conceptual framework, adapting their curricula and developing study materials and assessment tools. At the current initial stage in Israel, the education community is moving towards development, training and implementation efforts around the PISA framework. These efforts underline the need for collaborative learning, knowledge sharing, clear professional language and partnerships.

Assisting policy design and implementation. The mathematics curriculum in middle school is oriented towards knowledge, techniques and abstract thinking. In science, the curriculum aims to expose students to a broad range of topics, without applying advanced mathematics. Therefore, in-depth discussion with the Ministry of Education will strive at reaching a balanced and controlled mix, while maintaining the high level of abstract thinking. Providing feedback on progress through appropriate tools of assessment and evaluation will be essential.



*** Excellence is a high level of understanding, thinking and performance in which students are guided by the knowledge and skills they have learned, using them intelligently and creatively to contend with a new and complex situation.** This ability entails acquiring substantial knowledge, skills in analysis and in-depth learning, character traits of curiosity, initiative and communication, as well as moral values of individual and social responsibility.

From development to implementation | 2021-2022

The current crisis raises difficulties, but it also reinforces our commitment to our objective. During the next two years, we will advance from the development stage to an implementation phase. Along with independent learning at home, new classes of excellence will be formed, incorporating new learning materials and diagnostic tools. This process will be conducted with the help of digital tools, under the leadership of specially trained teachers and with a broad framework of public and professional support:

1. Focus on learning.

The frenetic transitions between distance learning, hybrid learning and learning in pods ("capsules") pose extraordinary challenges. Many students lose concentration and have difficulty making progress in their studies. The successful students are those who demonstrate qualities of diligence, persistence, planning and organization skills, as well as high motivation to learn and succeed.

In this new reality, the traditional divisions between teacher and students, between formal and informal education, and between hours of study and free time are no longer clear. The routines and schedules that defined teaching and learning in the classroom have changed, with the weight shifting more to the students. This requires them to be responsible and committed.

During the first wave of the pandemic, various tasks, quizzes and preparatory programs were developed and launched to help students learn independently. The teachers used digital platforms to give individual feedback. During the next two years, we plan to initiate creative and diverse activities that facilitate independent and group learning.

2. Challenging learning materials.

In many high performing education systems, the ability to use mathematics is defined as one of the goals of the school curriculum. Therefore, in addition to imparting knowledge and technique, the learning materials in these countries include complex problem solving and the use of mathematical modeling and reasoning. The underlying pedagogical concept for this combination is expressed in the PISA 2021 Mathematics Framework.

However, a study of the learning materials used in Israel's middle schools reveals that materials combining abstract and applied thinking rarely exist and seldom reach the classrooms. Therefore, our primary effort during the past two years has focused on developing such learning materials and diagnostic tools inspired by the PISA framework and appropriate for the high levels in the curriculum.

The effort is being conducted on two levels: mathematics lessons that involve context-based tasks, and science classes that involve advanced mathematical modeling. To date, the foundation has approved grants for 13 such programs that are developing 440 new tasks (340 for mathematics lessons and 100 for science lessons). The development

process is being executed along with teams of teachers who are trying out the tasks in their classrooms.

During the past summer, training commenced for lead teachers who will serve as early adopters of the new materials. Wider implementation is slated to begin soon, with the hope of eliciting feedback that will help improve the materials and tools and make them more precise. This will be followed by additional development focused on fields of knowledge that are still lacking in our portfolio and on adapting the tasks for distance teaching and harnessing digital tools for independent learning.

3. Ambitious teaching.

Teachers are welcoming the new learning materials with increasing enthusiasm. In the initial workshops, many teachers expressed concern that the applied dimension would come at the expense of their emphasis on knowledge and technique. After trying out the tasks and encountering difficulty themselves, they indicated that the impediments they face pertain to knowledge, skills and time constraints.

During the summer, we were therefore surprised when many more teachers than originally planned, asked to join the special training. They explained that when the teaching and learning shifted online, they found an immediate need for interesting and relevant materials to motivate their students. In their view, the new materials meet this requirement, since they offer in-depth learning in a real-world context.

Consequently, we decided to provide support for the teachers who are now starting to use the new tasks in their classrooms. These pioneer teachers are working in professional communities in order to learn from each other and develop expertise together. The communities will expand during the next two years, with an emphasis on making the adaptations necessary for distance teaching and for independent and group learning.

4. New excellence classes.

New materials and trained teachers should enable more students to study at a level of excellence. Toward this end, we are collaborating with local authorities, school networks and education districts to open additional classes of excellence. Each of these classes receive additional weekly hours from the school for mathematics and science studies.

The first to lead this effort include Beer Sheva, Netanya, Afula, Beit Shemesh, Umm al-Fahm, and Kafr Kana municipalities, the Amal network, the Branco Weiss network and the Ministry of Education's central district. They were recently joined by the Mofet program, which operates excellence classes in about 140 schools. Teacher training was conducted in previous months and over 70 new classes are scheduled to open soon; these classes will use the new materials.

In talking to the participating schools, we have learned that they are motivated to expand their potential for five units – in part, to dissuade top students from transferring to special schools. From their perspective, it is important that the learning content in excellence classes is at a high level, rousing the students' interest and

motivating them to invest in their studies. The question of whether the focus is on applied mathematics, or how closely it corresponds to PISA, is less significant for them.

The challenge schools are facing now, is the allocation of dedicated teaching hours to the new excellence classes. Some use hours provided by the district or from an Education Ministry program; others invest using their own resources. During the next two years, we will continue to support the opening of excellence classes of various models at the school and regional levels, whether physical or online, while incorporating the new learning materials and diagnostic tools.

5. Circles of influence:

A. Igniting public momentum. Parents and students are concerned about falling between the cracks of middle school. As such, they see the excellence classes as a lifeline providing a refuge and a pathway to five units in high school. We have learned that they feel assured that the learning in excellence classes is at high level, and do not express an opinion or stance vis-à-vis the specific content studied in these classes.

   The motivation of students to learn at a high level is individual as well as social. Studying in an excellence class requires effort and persistence, and the students see this choice as worthwhile because they derive benefit from it and because it allows them to study with friends who have similar interests and abilities. As is the case for their schools, Israel's ranking on the PISA exam is not a factor driving them to invest and excel.

   Therefore, during the next two years, we will focus on what really drives students and their parents – which is – their concern for the future, the fear of falling behind and the aspiration to join the path of success. We will illustrate and explain the choice open to them and why they should choose excellence already in middle school, work hard and persist, and support their friends so that they can succeed together.

B. Convening professional networks. R&D organizations are now working on preparing new learning materials and diagnostic tools in alignment with the PISA Mathematics Framework. They are doing so in collaboration with top teachers and are engaged in discourse with experts from leading countries in this field, including from the Netherlands, Poland, Singapore, Taiwan and Germany.

   During the next two years, we plan to expand activities aimed at gathering knowledge and convening professional networks. We will convene international online meetings, translate articles and commission research. As the new learning materials are incorporated in the new classes of excellence, we plan to organize joint discussions between decision makers, developers, teachers, education networks, local authorities and schools.

C. Assisting policy design and implementation. We are working in two tracks: a fast course and an infrastructure route. Classes of excellence that receive special hours are already incorporating the new materials at the local level. Discourse with

professionals at the Ministry of Education aims to support broader integration of the materials after the COVID-19 crisis is over. The Ministry is now examining the measured integration of materials into the curricula.

Curricula and assessment should go hand in hand. Therefore, in the upcoming two years we intend to continue to develop and implement diagnostic tools and assessments. We will conduct professional dialogue with policy makers on the need for additional assessment tools to complement the PISA exam, which is only conducted on a sample basis every three years.

Survey of Middle School Students – Midgam Institute (October 2020)	
During the COVID-19 crisis:	
Now is the time to invest in my studies and my future because despite COVID-19, it's not worth being behind.	**61.1%**
It's very important to me to invest and to excel in mathematics and science studies in middle school.	Students **85.8%** Parents **91.5%**
What makes me invest in my studies are thoughts about my future, the desire to excel and get high grades.	**82.8%**
Apart from my personal interest and desire, what most influences my decisions regarding my studies are my parents	**60%**
The main reason for my decision to study in a math and science excellence class in middle school, instead of in a regular class, is the desire to be accepted into a:	Five-unit track **33.7%** High-tech job **15.3%** Military unit **12.1%**

Next steps

The following two years will be a particularly important stage in the foundation's roadmap. It is the phase moving from development to initial implementation, as the efforts to prepare new materials and train teachers will meet the reality on the ground. The COVID-19 crisis poses difficulties and creates delays, but also accelerates and opens opportunities. Therefore, we plan to step into this phase with the required modifications and closely monitoring progress, while making improvements along the way.

The new learning materials are the centerpiece of this effort. During the past two years, we have focused on creating a rich and varied arsenal of challenging materials that

express a high order of applied mathematical thinking. These materials provide a practical laboratory for the new direction we set and enable the professional community to conduct a critical discourse and find a balanced and appropriate way to integrate them into the curricula.

The materials are now ripe for testing, feedback and implementation. For this purpose, communities of teachers are being formed to pave the way, and new classes of excellence are opening throughout Israel. Due to the limited school-based learning in the shadow of COVID-19, the materials will be adapted for distance teaching and independent study. It is obvious that this process will be complicated and that there will be obstacles and bumps along the way.

The students are now in the eye of this storm. With all of the noise and tumult around them, they need to concentrate on their studies; they must remain persistent and make a substantial effort in order to succeed. A challenging mission awaits them, and they will need inner strength, determination and support. Their parents, who fervently want to lead them toward a better future, and their teachers, who are with them on this uphill climb, have a particularly important role to play.

We hope that the crisis will not last a long time, that schools will resume full operation and that we will be able to issue a public call to parents and students to choose excellence in middle school. We are preparing for that day, while encouraging research and ongoing dialogue with our partners.

Meanwhile, the next international PISA exam is expected to take place in 2022. The results of this cycle will serve as a benchmark and will help us plan our next steps.