**The National Institute for Advanced Mathematics and Science Teaching**

*A joint venture of the Ministry of Education and the Weizmann Institute of Science in partnership with the Trump Foundation*

**Establishing Document**

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# **Background**

Excellence is the main key to the strength and prosperity of the State of Israel. As a country that built itself on science and technology, anyone who possesses knowledge and competence in these fields can find fertile ground for the realization of their skills here. In Israel today, excellence in mathematics and the sciences constitutes a springboard for the future.

The expansion in Israel of the circle of excellence, curiosity, and critical and rational thinking also constitutes an educational mission to provide opportunities and narrow gaps. Excellence is the engine in whose name we urge students from all social sectors and all regions to dare, push ahead and embark on their personal journeys.

High school education trains Israel's students how to cope with complex problems and to create innovative solutions. Thus, they are considered to be prepared for the challenges and opportunities of the 21st century, as individuals who, in the future, will be able to contribute to breakthroughs in science and industry, cure disease, strengthen security, and improve quality of life.

During their studies, students develop character traits of creativity, independence, and initiative; as well as learning habits and a willingness to advance, invest, and practice. They experience difficulties and overcome pressure, master the ability to learn from mistakes, and strive for truth with determination and consistency.

Today, the National Institute for the Strengthening of Excellence in Mathematics and the Sciences has succeeded in stemming the collapse in the number of graduates in five units, and to drive significant growth. Many students, in the center and in the periphery, religious and secular, Hebrew and Arabic speakers, are choosing the five-unit track in high school.

The past few years have demonstrated that, in Israel, excellence transcends borders, that many students can succeed, that this is their basic right, and that it is the duty of us all to provide them with equal opportunities for a quality education and for studies at the highest level.

Number of five-unit graduates



Based on a Ministry of Education press release from July 2017

Y axis: Number of graduates

X axis: Black line = Chemistry, blue line = mathematics; gray line = physics

# **Opportunity and Need**

The turnaround in excellence over the past few years has been achieved as a result of a special combination of different branches. Government policy and national planning have paved the way and defined the direction, while academic institutions built tools and developed capabilities, and have been joined by many elements from all sectors of Israeli society; from industry, the army, local government, and civil society.

All these together have created momentum and formed a network that encompasses and supports teachers in classrooms. Teachers have embraced the opportunity, taken professional responsibility, set ambitious goals for each student, helped them cope with difficulties, and helped them succeed at the highest level.

At the same time, the great challenge faced by the education system lies in how to cope with the heterogeneity and lack of equity that characterizes Israeli society. Thus, education in Israeli needs to adapt itself to the abilities, difficulties, way of thinking, and pace of study of each student, and to their educational and cultural backgrounds.

In recent years, new professional practices have been developed in academic institutions and in the field of education that help address various challenges.[[1]](#footnote-1) These practices are based on work in professional teacher communities, and are supported by research and by teachers' analytical views of their work, based on data collected in the classroom.[[2]](#footnote-2)

This is a profound teacher-led pedagogical revolution. The traditional professional development approach of in-service training and frontal lectures have been replaced by a clinical, experiential, analytical, and data-based approach. Students are placed at the center. The labeling and streaming of students has been replaced by diagnosis and support; giving up and failure have been superseded by a developing trust in personal ability through effort and perseverance.

The classroom door, which had always been closed, has now been opened. Professionalism in teaching has begun to be built together with, and within, communities in which teachers are improving their teaching in partnership and with openness. Documentation, testing, and simulation tools bring the classroom to the community discussion table and practical expertise is being improved.

This pedagogical revolution is being facilitated by a leading cadre of excellent teachers. This is a new professional leadership cadre, from which an ethos of evidence-based experiential teaching is growing, and it is translating the goals of national excellence into the professional work of teachers in the field.

*Advanced teaching = a degree of hands-on expertise, which is mainly a personal response to the learning of each student. This is teaching based on a belief in the personal ability of each student to succeed, the setting of ambitious learning goals, continuous examination of learning progress, personal adjustment to the abilities, difficulties, thinking style, and pace of each learner, and the provision of constructive and powerful feedback. Such teaching takes place and is built on four levels of the teacher's encounters – with the student, with the classroom, in the school, and in the professional teacher community.*

# **Target Community**

The success of the national program has created momentum for investment in professional infrastructure. It is clear that we cannot rest on our laurels, and that what is needed is a professional infrastructure such providing a solid foundation for this change in direction, making it more than a mere flash in the pan.

The stratum of teachers leading this advanced clinical teaching revolution constitutes an important element of this infrastructure, and needs to be expanded and strengthened. To date, the work of these leading teachers has been conducted within sporadic frameworks, with a temporary budget, with limited coordination between teachers, and without shared standards.

There is a target community of around 3,500 leading teachers in high schools, who constitute around 15% of all mathematics and science teachers in grades 7-12. Apart from teaching, these teachers support the learning of their fellow teachers as community leaders, guides, professional coordinators, mentors, and pedagogical facilitators.

Today, the important role of these leading teachers needs to be recognized, and they need to be granted compensation and professional status, allowing them to build professional standards, and create national training programs and frameworks. To this end, they need a professional home, where together they can build continuous improvement in teaching quality.

# **The National Institute for Advanced Mathematics and Science Teaching**

In order to provide every student in Israel with appropriate teaching, and in order to expand the circle of excellence, develop values and scientific thinking, and allow as many students as possible to push ahead and go as far as they can, it is hereby proposed to establish "The National Institute for Advanced Mathematics and Science Teaching" (hereinafter: "the Institute").

The Institute will serve as a professional home for the leadership of advanced clinical teaching, which will grow together and from within pedagogical excellence based on practice, and focused on providing a response to the learning of each student. The Institute will work to implement government policy on the subject, and as an independent center of expertise and development.

Roles:

1. To establish an elite cadre of leading teachers of mathematics and the sciences in high schools, to enable them to create professional advanced career tracks and to develop in the skill field of evidence-based clinical teaching, as well as in accordance with the science education policy of the Ministry of Education.
2. To define, formulate, and implement standards and specializations, training, and certification courses, as well as the accompanying processes for teachers in leadership positions in accordance with Ministry of Education policy, with emphasis on the work of the Science Division and the Professional Development Division.
3. To budget and guide operating frameworks for the clinical professional development of teachers (for example, teacher communities, instructional coaching) nationwide, in academic guidance, and inter-university curricula.
4. To develop tools and methods for clinical teaching (for example, video, diagnostics, simulations, protocols, personal learning programs), to test them out in the field, to coordinate them, and disseminate their use among all mathematics and science teachers.
5. To conduct in-depth dialog with the leading teachers, to build programs by learning from their practical knowledge, to listen to their needs, and to make available practical knowledge through various means (workshops, conferences, the internet).

Outcomes:

1. At the end of three years, 200 teacher communities will operate nationwide; around 200 professional coordinators, 400 master communities, and around 50 skilled and qualified instructors. Standards and competencies for leading teachers will have been developed, tested, and validated; a budgeting and guidance system for professional communities throughout the country will have been developed, including in the periphery; an inter-university coordinating framework will have been established for the development and integration of clinical tools.
2. After five years, 300 teacher communities will operate, on an annual basis, throughout the country; around 500 professional coordinators, 600 master communities, 500 instructional coaches, and around 100 skilled and qualified instructors; an arsenal of clinical tools will be integrated into professional development and in the field; an annual conference, professional workshops, prizes for excellent, periodicals and websites.

Results:

1. Leading teachers of mathematics and the sciences will view the Institute for Advanced Teaching as a quality professional home and will report on its great positive contribution to improving the quality of their teaching.
2. Flourishing teacher communities, the focus of whose work is clinical skills and improving the pedagogical responses appropriate for each student.
3. Clinical teaching skills are integrated into practice and become part of the professional specialization and routine in classrooms in schools.
4. Improved student learning, as reflected in an increase in the number of students of mathematics, an increased selection of mathematics and science in high school, a reduction in dropouts and increase in the number of successful graduations.

# **The Joint Venture**

The Ministry of Education and the Trump Foundation have conducted an in-depth discussion process, during which various possibilities were examined. Eventually, it was agreed to formulate a joint approach to the Weizmann Institute of Science. The intention is that the National Institute for Advanced Mathematics and Science Teaching will be established as a joint venture between the Ministry of Education and the Weizmann Institute in partnership with the Trump Foundation.

The choice of the Weizmann Institute is based on the fact that this is a world-renowned scientific research institution, and one of the founding fathers of education in Israel, as well as a current leader among scientific education institutions in Israel. The first center for science education in Israel was established under its patronage, and the first textbooks for schools written.

The administration of the "Tomorrow 98" program is carried out under its auspices; this currently serves as a professional home for science teachers in Israel, and operates most of the Ministry of Education's national teacher centers in secondary education. The Institute conducts research and development with a broad-based and quality professional staff specializing in advanced degrees and advanced teaching skills.

The topic of science education has been a high priority for the Weizmann Institute over the years, and constitutes a core area of its work. Alongside the department for science education, the Institute has established and works alongside the Davidson Institute for Science Education, the Hemda Centers in Tel Aviv, and the Schwartz Center in Rehovot and Rishon Lezion, which carry out important and groundbreaking activities.

The expectation is that the Weizmann Institute will provide the Institute with a suitable physical building and infrastructure, and that it will create suitable frameworks for the employment of its human resources and other manpower. The Weizmann Institute will operate jointly with the Ministry of Education to secure funding for the activities of the Institute, including after the completion of the joint venture, and the completion of the Trump Foundation funding. Although the Institute will be established in partnership with the Weizmann Foundation, the Institute will apply, either directly or via the Ministry of Education, equally to academic institutions across the country in order to realize its goals.

# **Governance**

The National Institute for Advanced Teaching in Mathematics and the Sciences will be operated by the Weizmann Institute and will be managed under its framework. The Institute will function in coordination with the Ministry of Education's professional development and training policy, and in coordination with the Research and Development Center for the Professional Learning of Teachers in Israel.

The Institute will operate through four institutions -- an Executive Committee, a Finance Committee, an Institute Director, and a Steering Committee. In addition, an international advisory council will be established.

## **6.1 The Executive Committee**

The Executive Committee will meet at least twice a year and its remit will be: to determine the Institute's operational policy, to approve the multi-year and annual work plans, to approve the operational budget and budgetary changes, to monitor and supervise the Institute's achievement of its goals, and to appoint the Director of the Institute.

The Executive Committee shall appoint 18 members and its composition shall be as follows:

1. The Minister of Eduation – Chairperson (if s/he is unable to attend a meeting then the Director General of the Ministry of Education shall attend in his/her place);
2. The President of the Weizmann Institute – Deputy Chairperson (if s/he is unable to attend the meeting, the Vice President shall attend in his/her place);
3. Five members selected by the Minister of Education according to their roles: The Director of the Education Administration; the Director of the Science Department; the National Programs Director; the Director of the Department for the Professional Development of Teachers in Israel; Professional Center Supervisors (selected by the Chairperson of the Pedagogical Secretariat and the Director of the Science Department).
4. Two representatives from the Weizmann Institute, who will be appointed by the President of the Weizmann Institute.
5. Two representatives of the Trump Foundation, who will be appointed by the Director of the Trump Foundation;
6. Two representatives of other universities, to be appointed at the recommendation of the Director of the Science Department and the Deputy Chairperson of the Executive Committee;
7. Five teachers, who will be appointed at the recommendation of the Director of the Science Department and the Deputy Chairperson of the Executive Committee.

## **6.2 The Finance Committee**

The Finance Committee shall approve the financial statements as well as transfers from section to section in excess of 20% of the annual budget.

The composition of the Finance Committee shall be as follows:

1. Two representatives appointed by the Education Minister according to their roles: the Ministry's accountant (or his/her deputy) and the head of the Department for the Professional Development of Teaching Staff;
2. The head of the Finance Department of the Weizmann Institute;
3. A representative of the Trump Foundation.

## **6.3 The Institute Director**

The Institute Director will be appointed by the Executive Committee according to a process determined by the Chairperson of the Executive Committee and the Deputy Director of the Trump Foundation, who will approve the appointment **with their agreement**.

The Institute Director shall fulfil the following conditions: possess at least three years of experience in teaching mathematics and sciences in an Israeli high school; a broad pedagogical vision; a master's degree or preferably a PhD in mathematics or science teaching; experience in managing an organization; the ability to lead professional staff; familiarity with the work patterns of teaching staff and higher education; and the ability to develop links with similar bodies outside of Israel.

The Institute Director's tasks will include formulating the Institute's multi-year work-plan and its annual work-plan, and submitting it for approval by the Executive Committee and Finance Committee. In preparing the work-plans, the Institute Director will take into account the needs and expectations of the leading teachers, the voice of the scientific research community, and government policy, based on the recommendations of the Steering Committee headed by the Professional Center Supervisors for the mathematics and sciences professions in the Pedagogical Secretariat and the Administration Management for Teaching Staff.

## **6.4 The Steering Committee**

A Steering Committee will be established in every disciplinary field (mathematics, physics, chemistry, biology), and will recommend the topics to be dealt with by the Institute. Each Steering Committee will have a center chosen by the Sciences Department Director in consultation with the Deputy Chairperson of the Executive Committee.

The Institute's work-plan will take into account / rely on the recommendations of the various Steering Committees and will be approved by the Executive Committee once a year.

## **6.5 The International Advisory Council**

The International Advisory Council will advise the Institute on pedagogical and professional matters linked to its activity. It will be headed by an international personality from the educational research field, who will be appointed by the Executive Committee, provided that agreement has been obtained from the Chairperson of the Executive Committee, his/her deputy, and the Director General of the Trump Foundation. The remaining members of the Council, who shall number no fewer than ten, will be appointed by the Executive Committee from among those with recognized status in Israel and abroad in the fields in which the Institute operates.

# **7. Budget**

The Institute's multi-year budget framework for five years shall be a total of 140,000,000 NIS (see appendix). The budget shall be divided equally between the government (50%) on the one hand, and the Weizmann Institute via the Trump Foundation (50%) on the other hand. The payments to the Institute shall be implemented by the parties on a quarterly basis, according to a payments schedule and in accordance with progress reports, and will be transferred to the Weizmann Institute. The accountant of the joint venture shall be the accountant of the Weizmann Institute.

The Weizmann Institute shall maintain a separate set of accounts for the Institute, including managing a separate and dedicated bank account and managing a separate and dedicated bookkeeping system, separate financial statements, and separate notes in its financial statements.

The Ministry of Education will approve the agreement in its Central Purchasing Committee and in the Ministry of Finance's Exemption Committee, and will also obtain authorization to commit to the total amount of its share in the Institute's multi-year budget. The Trump Foundation will approve its part at the meeting of the Foundation's Board of Directors and will sign a grant letter together with the Weizmann Institute. At the end of the agreement period, the Ministry of Education and the Weizmann Institute will work to raise budget funds for continued activity in accordance with the rules of the joint venture.

# **8. Appendix: Framework for distribution of funds between the partners**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | 2018 | 2019 | 2020 | 2021 | 2022 | Total |
| Activity- Ministry of Education | 5M NIS | 7.5M NIS | 10M NIS | 12.5M NIS | 15M NIS | 50M NIS |
| 100 communities | 150 communities | 200 communities | 250 communities | 300 communities |
| Professional and management activities – Ministry of Education | 2.5M NIS | 3.5M NIS | 4M NIS | 5M NIS | 5M NIS | 20M NIS |
| Development, training and knowledge – Trump Foundation | 15M NIS | 16M NIS | 15M NIS | 13M NIS | 11M NIS | 70M NIS |
| Total | 22.5M NIS | 27M NIS | 29M NIS | 30.5M NIS | 31M NIS | 140M NIS |

1. National Research Council (2012). ***A Framework for Science Education: Practices, Crossing Concepts and Core Ideas*.** Committee on a conceptual Framework for New K-12 Education Standards; Board on Science Education, Division of Behavioral and Social Sciences and Education. Washington, DC: The National Academies Press [↑](#footnote-ref-1)
2. National Academies of Sciences, Engineering, and Medicine. (2015). ***Science Teachers Learning: Enhancing Opportunities, Creating Supportive Contexts***. Committee on Strengthening Science Education through a Teacher Learning Continuum. Board on Science Education and Teacher Advisory Council, Division of Behavioral and Social Science and Education. Washington, DC: The National Academies Press. [↑](#footnote-ref-2)