SCIENTIX
The community for science education in Europe

2015 SURVEY ON EFFORTS TO INCREASE STUDENTS' INTEREST IN PURSUING STEM STUDIES AND CAREERS

NATIONAL RESPONSE: ISRAEL

European Schoolnet

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- Policy, research and innovation: information sharing and evidence building.
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Access to the report online: http://www.scientix.eu/web/guest/observatory/comparative-analysis-2015

Keywords: Science, Technology, Engineering and Mathematics (STEM); European initiatives; Initial teacher training; Professional development; Online courses; Teacher recruitment; Responsible Research and Innovation

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INTRODUCTION

Rationale:

Europe needs an adequate output of qualified scientific specialists to foster a dynamic and innovative knowledge-based economy. To achieve this goal we need to increase participation in Science, Technology, Engineering and Mathematics (STEM) studies and careers, especially the number of women. We are therefore interested in collecting up to date information regarding measures in your country to increase students' interest in studying STEM subjects at primary and secondary levels and to pursue careers in these areas. The information you will provide will be collated and used to draft an analysis of the situation across Europe, to help you reflect on your own countries measures in comparison to others.

Updated and new information required:

This report is intended to provide updated information on what is already available in European Schoolnet's Insight Report, developed within the framework of the SPICE project[1], entitled Efforts to Increase Students' Interest in Pursuing Science, Technology, Engineering and Mathematics Studies and Careers *(*http://www.fisme.science.uu.nl/publicaties/literatuur/2011_european_schoolnet.pdf*)*, published in 2011. The 2011 report only provides information for 21 countries. The aim of the 2015 report is to update the information for these countries as well as add information about recent, ongoing or planned initiatives since 2012 for the 9 countries who did not feature in the earlier report (namely: BG, HR, CY, EL, HU, LV, MT, PL, UK).

Answering this survey from the national perspective:

The aim of the report resulting from the information provided by this survey, is to catalogue the main recent and currently running STEM education initiatives in each of the 30 countries represented within Scientix 2. It is therefore in the first instance the responsibility of the Scientix 2 National Contact Points (NCPs) to answer this questionnaire from the perspective of the Ministry of Education, or the national agency dealing with STEM education which they work for. If you are an NCP not representing your national Ministry of Education or national agency dealing with STEM

[1] http://spice.eun.org

education, then you are kindly asked to ensure that you send this questionnaire to either/both of these bodies so that they can provide input. You are then invited to of course provide your own input on the basis of the knowledge and experience of your own organization.

As STEM education initiatives involve a wide range of actors and stakeholders and this varies from country to country, we advise all NCPs to firstly fill in the questionnaire from the perspective of the organization they represent, and then secondly to send it to relevant colleagues internally, as well as to others externally (from the public or private sector) as appropriate. Please be sure to mention each contributor's name, position and organization in the space provided at the start of the survey. In this way, we can be sure to acknowledge everyone's contribution accurately, as well as inform our readers of the different perspectives included in the report. Please note however that the aim of the report is not to provide an exhaustive catalogue of every national initiative in each country, but rather to highlight the most important ones.

Definition:

Science, Technology, Engineering and Mathematics (STEM) subjects include: Mathematics, Engineering, Physical Sciences, Life Sciences, Computer Science, and Technology[2]. In some curricula STEM subjects may also appear under the titles of Physics, Biology, Chemistry, Earth/Environmental sciences, Astronomy, and IT (Informatics).

[2] Rocard et al. (2007) High Level Group on Science Education, Directorate General for Research, Science, Economy and Science, European Commission, Science Education Now: A Renewed Pedagogy for the Future of Europe: http://ec.europa.eu/research/science-society/document_library/pdf_06/report-rocard-on-science-education_en.pdf

Structure of the questionnaire:

The questionnaire is divided into 9 sections (A-I):

SECTION A: STEM EDUCATION PRIORITIES AT NATIONAL LEVEL

This section aims to understand to what extent STEM education is currently a national priority, and which specific areas of STEM education are countries focusing on at national level.

SECTION B: NATIONAL STEM EDUCATION STRATEGIES, CENTRES AND CAMPAIGNS

This section aims to collect up to date information about each country's recent, ongoing or planned STEM education strategies (where they exist), as well as national centres, campaigns and competitions aimed at improving teaching and learning in this area and/or popularizing STEM at the level of society.

SECTION C: NATIONAL CURRICULUM AND ASSESSMENT REFORM IN STEM EDUCATION

This section aims to collect up to date information about each country's recent, ongoing or planned curriculum and assessment reform impacting STEM school education.

SECTION D: NATIONAL STEM INITIAL AND IN-SERVICE TEACHER EDUCATION

This section aims to collect up to date information about each country's recent, ongoing or planned initiatives in the area of STEM initial and in-service teacher education. It also asks specifically about the provision of online professional development for STEM teachers at primary and secondary level, as well as to what extent certain knowledge and competence areas of STEM teachers are sufficiently covered by training available at national level. This section also addresses specific initiatives aimed at recruiting STEM teachers at national level, especially females.

SECTION E: NATIONAL STEM CAREER GUIDANCE INITIATIVES

This section aims to collect up to date information about each country's recent, ongoing or planned initiatives aimed at improving the provision of STEM career guidance, whether targeting teachers or career counsellors and/or directly students.

SECTION F: NATIONAL STEM GENDER BALANCE INITIATIVES

This section aims to collect up to date information about each country's recent, ongoing or planned initiatives aimed at improving the gender balance at national level of students who pursue STEM studies and/or careers.

SECTION G: THE USE OF ICT IN STEM EDUCATION

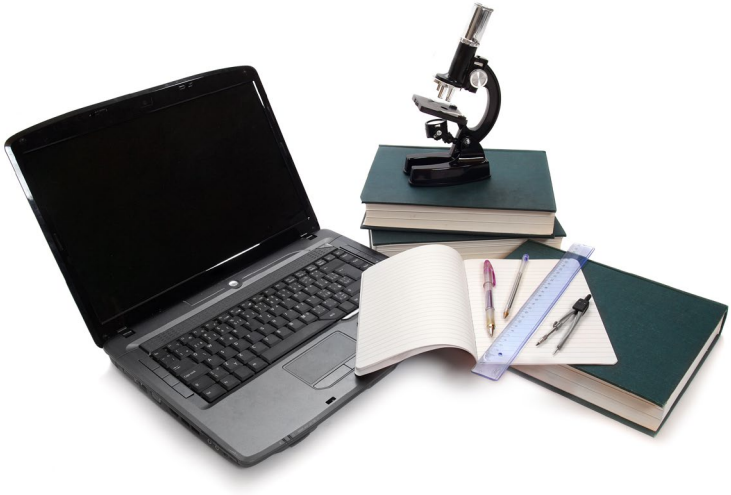
This section asks about the availability of specific guidelines at national level on how to use ICT for STEM teaching and learning, and to what extent ICT is actually used for this purpose in reality.

SECTION H: NATIONAL INITIATIVES TARGETING THE INTEGRATION OF RESPONSIBLE RESEARCH AND INNOVATION (RRI) PRINCIPLES AND PRACTICES IN STEM EDUCATION

This section looks at the new concept of Responsible Research and Innovation[3] in the context of STEM education, and asks countries to indicate to what extent this concept is currently prevalent in STEM education at national level and which aspects are emphasized.

SECTION I: ADDITIONAL INITIATIVES AND INFORMATION

Please use this section of the survey to provide information about any relevant initiative you have not mentioned in answer to any of the previous questions. Moreover, please feel free to mention any further contextual information relevant to your country.



[3] For more information about the concept of Responsible Research and Innovation and how the European Commission defines this, see here: https://ec.europa.eu/programmes/horizon2020/en/h2020-section/responsible-research-innovation. For information about the European project, Responsible Research and Innovation Tools – RRI Tools, involving 30 countries see here: http://www.rri-tools.eu/.

INFORMATION ABOUT THE SCIENTIX NCP RESPONSIBLE FOR THE NATIONAL RESPONSE TO THIS SURVEY:

COUNTRY:	ISRAEL

NCP's name:	Dov Winer
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NCP's organization:	Makash – Advancing ICT Applications in Education

A STEM EDUCATION PRIORITIES AT NATIONAL LEVEL:

1a) Is STEM education currently a priority area of your national Ministry of Education or any other part of the educational community? If yes, how long has it been so and how likely is to remain so in the near future?

Yes

Short explanation:

STEM education is rated very high in the Israel national priorities. The Israel is now highly concentrated on the development of higher technologies and in occupations requiring a STEM rich education became. Therefor STEM education became a focus of an intensive public discussion and debate that his can be gauged from the many initiatives: the involvement of the National Council for Research and Development (Civil) which commissioned surveys and papers to have solid evidence to steer its decisions; many meetings of Parliament committees dedicated to STEM related education; background papers prepared by the Center for Research and Information of the Parliament (Knesset); the priority for STEM in projects carried out by the Israel Academy of Sciences Initiative for Applied Research in Education; the role of STEM in the ongoing reforms being implemented by the Ministry of Education in collaboration with the teachers' syndicates; a profusion of activities by the public sector involving leading foundations and high technology corporations; surveys, research and papers commissioned by these initiatives. Links to a selection of such resources is provided in the last section of the present survey.

The report commissioned by the National Council for Research and Development (Civil) from the Neaman Institute summarizes some basic data:

Dr. Daphne Getz, Prof. Dan Peled, Tsipy Buchnik, Ilia Zatcovetsky, Dr. Eran Leck, Ella Barzani (2013). Science , Technology and Innovation Indicators in Israel: An International Comparison (Fourth edition). Neaman Institute for National Policy Research, Haifa.

Available here (English)

- 45% of the population in Israel at working age have a post-secondary education or higher (2009), this is among the highest levels among the OECD countries
- 82% of higher education holders are employed. In international comparisons Israel stands in the lower half of the table. Lower that countries like Norway (90%), Switzerland (89%), Sweden and the Netherlands (88?%).
- Among the students completing their secondary education 56% are entitled to a Baccalaureate diploma; 46% stood up to the minimum requirements from the universities (2010). 14% choose to complete 5 units of Mathematics (the maximum).
- In international examinations comparisons Israel showed a substantial improvement in TIMSS Mathematics in 2011. Israel got the 7th position among 42 (up from place 17 in the prior exams).
- From the year 2010 among the new students 25.5 % choose to study in STEM areas. There is a diminishing trend for such rate since the year 200 (37.1%).
- In the year 2008/9, 8700 students completed a first academic degree in STEM disciplines. Among them 56% study engineering and architecture; 21% Mathematics, Statistics and Computer Science; 15% Biological Sciences; and 7% Physical Sciences.

- The Research and Teaching staff was 9,740 staff members in the universities and 3,530 in the colleges (2010/11). This number has almost not changed in the last ten years. The lack of proper absorption of new senior staff accelerates the aging of the Academic staff; the median age of staff at the Full Professor status is 61.
- In Israel there are 53 thousand employees in the different branches of RTD in the business sector (2008) among them 60% of the jobs are in branches of computer related RTD and services.

See also:

Dr. Edith Manny-Ikan and Dana Rosen (2013). Teaching Sciences in Israel: trends, challenges and change levers. The Henrietta Szold Institute, Jerusalem (Hebrew)

http://www.szold.org.il/_Uploads/dbsAttachedFiles/skirahoraatmadim.pdf

1b) If STEM education is not currently a priority area, please explain why this is the case, and whether it is likely to become one in the near future.

2a) In the box below, please indicate what level of importance each STEM education issue currently has in your country (considering all relevant bodies/levels e.g. the Ministry of Education, national agencies, schools, the wider community, international and national initiatives and programmes etc.)

Please rank each issue by inserting the relevant number to illustrate your country's current STEM education priorities (1 = Addressed as a top priority; 2 = Addressed as an important issue; 3 = Addressed to some extent; 4 = Not addressed).

STEM EDUCATION ISSUE	IMPORTANCE RATING
Promotion of inquiry-based learning (experimental, hands-on, investigative activities)	1 - 2
Promotion of context based teaching approaches focusing on socio-economic aspects of science (linking science with everyday life and current issues)	2 - 3
Promotion of the principles and practices of Responsible Research and Innovation (RRI) in STEM curricula/teaching and learning resources/ initial teacher training or in-service teacher training programmes	1 -2
Promotion of small group discussions in science classes	3
STEM curricular reform at primary level (please specify the age-range of students concerned)	2 -3

STEM EDUCATION ISSUE	IMPORTANCE RATING
STEM curricular reform at secondary level (please specify the age-range of students concerned)	1
The development of new assessment methods for STEM education	1
The development of new or revised STEM teaching resources (e.g. printed/digital handbooks for teachers etc.)	1
The development of new or revised STEM learning resources for students	1
Addressing the gender balance of STEM teachers	3
Addressing the gender balance of STEM students	2
The improvement of STEM primary teacher education	2
The improvement of STEM secondary teacher education	1
Integration of the effective use of ICT in STEM education	1 - 2
STEM career guidance	3
Other (please specify)	

2b) Please provide an explanation for the STEM issues you rated as being '1=top priority' and '2=Addressed as an important issue' in your country, in the box below. Please provide brief details of why these issues are addressed as priorities at nat ional level (e.g. making reference to national research and/or your country's performance in student achievement in science as measured by PISA and TIMSS if relevant). You will be asked to provide more detailed information about specific initiatives in these areas reflecting these priorities in section B. of this questionnaire.

See remaining sections of this survey

B NATIONAL STEM STRATEGIES, CENTRES AND CAMPAIGNS:

3a) Does your country have or plan to develop a national strategy for STEM education?

Yes

3b) Please describe the strategy briefly, including its main objectives, as well as any references to relevant reports/URLs/evaluation studies (remembering to indicate if they are only available in your national language or in English).

Reforms and the national strategy

Israel strategy for STEM education must be considered on the background of ongoing deep, comprehensive, reforms in the educational system and the curriculum.

Ofek Hadash (New Horizon) is and educational and professional reform for the primary and junior high school system first proposed in 2008. Its goals are: (1) improvement in the status and income of teachers (2) structuring the teaching job tasks: frontal teaching hours, individual/very small groups teaching hours, and time to stay in school for pedagogical and organizational tasks (preparing lessons, coordinating committees etc). (3) Empowerment of teachers and the managers through professional development processes along their career (4) Strengthening teaching and management through evaluation procedures of teachers.

This program added 900 thousand hours for teaching individuals and/or groups of 2 to 5 children; this should support about 300 thousand children. In 2010 the program reached 1,200 schools.

"Ofek Hadash – a turning point for education in Israel" – Site of the Ministry of Education:
http://cms.education.gov.il/EducationCMS/Units/Ofek/ Bing English translation

Oz Letmura (Courage for Change) is the reform targeted mainly to the secondary sector (high schools). It includes changes in pedagogy, administration and conditions of employment of teachers. The teachers' wages are to be significantly increased, by more than 51%. The reform includes the structure of the teachers' week: 40 hours including 24 of frontal teaching, 6 individual (or small groups) and 10 hours for supporting activities. Excellence in teaching: professional advancement and rewards based on evaluation and excellence. All the teachers in schools that excel in their learning, social and value achievements are to be rewarded. The status and authority of the principals are to be strengthened. Improvements in the working environment of teachers adapting it to the new structure of the working week.

"What includes the reform 'Oz LeTmura'" – Site of the Ministry of Education:

http://cms.education.gov.il/EducationCMS/Units/oz/MaBeOzLatmura/ Bing English translation

Higher Critical Thinking Capabilities

In 2007-2009, at the time when the above mentioned reforms started to be negotiated and then beginning to be implemented, the MoE decided to start the process for curricular changes. The purpose was to change the curriculum emphasis on contents to focus instead on higher critical thinking capabilities. These capabilities are deemed essential for success and effective functioning in every aspect of life of the individual and society

in the age of information. Therefore it is important to cultivate the students' familiarity with high order thinking strategies and the ability to run them in various contexts. The reform is intended to help educators make the development of thinking an integral part of teaching the different disciplines.

"Thinking and Learning Capabilities" – Site of the Ministry of Education

http://cms.education.gov.il/EducationCMS/Units/Tochniyot_Limudim/Portal/Kishurim/Chashiva.htm
Bing English translation

Among the higher thinking strategies to be developed there are: Comparison; Deduction; Identifying components and relationships; Categorization; Asking questions; Proposing diversified points of view; Proposing diversified potential solutions for problem solving; Hypothesis; Separating variables; Presentation of information and/or knowledge in diverse ways; Argumentation; Justifying the knowledge and evaluating it; Integration.

[from: Higher thinking strategies: guiding document for national and local curriculum planners and for developers of learning resources. Edited and produced by Dr. Tzofia Yoad. Ministry of Education, Pedagogical Secretary, Division for Planning and Development of Curricula, Jerusalem 2009 (Hebrew)

http://meyda.education.gov.il/files/Tochniyot_Limudim/Portal/EstrategyotChashiva.pdf

The operational translation of this strategy demands a whole system transformation with simultaneous changes in three strands: (1) Evaluation – the Baccalaureate and Meitzav examinations (2) Curriculum, standards and learning resources (3) Professional development, educators and teachers, initial training and in-service continuing education.

STEM at the primary and the secondary level of education

We should distinguish strategies concerning STEM from the kindergarten up to the Junior High School (9th grade) and those focused on the High School level of education (10-12th grades).

From Kindergarten to Junior High School

The Sciences in Israel are teached based on the report of the High Level Committee for Science and Technology Education from 1992 "Tomorrow 98". The discipline "Science and Technology" is conceived as having a spiral curriculum in which the content is distributed and revisited repeatedly over months and across grades beginning in the kindergarten, through the primary and junior high school and including those students in the 10th grade at high school who do not choose to specialize. This is a multidisciplinary field based on an integrative educational approach also known as STS=Science, Technology, Society. Each content matter is studied from three different aspects: the Scientific, knowledge and investigative basis; the Technological (harnessing scientific knowledge for designing devices and products) and the Social, Environmental and Value aspect (Setting goals and needs). The purpose is to foster the citizen knowledge and skills enabling him to cope with the rapidly changing reality.

See:

Klein, S. (2011). Integration of contents and skills in teaching and learning natural sciences according to the Israel curriculum. Survey commissioned as background resources supporting the work of the Committee "Path setting research: proposal for new organization of the curriculum". The Initiative for Applied Education Research of the Israel Academy of Sciences. (Hebrew)

http://education.academy.ac.il/Uploads/BackgroundMaterials/Hebrew/Organize%20school-review-science-klein.pdf

STEM in Secondary Education (High School)

At the conclusion of the 9th grade and before entering high school the students are required to choose the composition of the Baccalaureate diploma. There are two main modes for STEM studies. One is a Technological trend in which the student focus on Sciences studies (Chemistry, Physics, Biology or Technological Sciences) together with Technological studies. Alternatively they can focus only in Sciences that include Physics, Chemistry, Biology or Science and Technology in Society.

"Scientific Technological Education at the Secondary School" from the Ministry of Education site:

http://cms.education.gov.il/EducationCMS/Units/MadaTech/ChinuchMadaiTech/hemshchKriaa.htm
Bing English translation

Sciences strand: strategies concerning Mathematics and Sciences in the Secondary

Mathematics

Strategy: Mathematics First

The purpose of this strategy is to increase the number of students studying 5 units of Mathematics from the present number of 9,000 to 18,000 in five years; the program began in school year 2014/2015 and it was expected to increase, already in the first year, the number of student by 15%.

In the last six years the number of students that choose to study 5 units of Mathematics for their Baccalaureate diploma (the highest number of units) has dropped by 30%. The diminishing numbers of those who study an intensive Mathematics course of studies has a negative impact on the scientific, technological and economic capacity of the country to stand by the challenges of the 21st Century. In the school year 2014/2015 the Ministry of Education decided to encourage secondary schools to open new study groups for intensive mathematics at the level of 5 units and that choose to be examined for 5 units. The Ministry decided to incentivize new study groups in the grades 10th, 11th and 12th and/or will increase the budgeting for teaching hours in existing groups.

The activities that are supported by the increased budget are additional teaching hours for existing classes or for the splitting of a class into groups of 15 students (such groups should have a minimum of 12 students and maximum of 15). Furthermore additional budget will be provided for new groups of students in case there are students learning for 5 units in addition to the number of students who studied for 5 years in the same cohort in the previous year.

Additional budgeting for teaching hours in Mathematics 5 units in grades 10th, 11th and 12th beginning from the year 2015 (2014/2015).

http://cms.education.gov.il/EducationCMS/Units/Mazkirut_Pedagogit/Matematika/ChativaElyona/kol_koree_math.htm Bing English translation

Technological strand: strategies concerning Technological and Sciences studies in the Secondary

Several technology disciplines that are included in the secondary education are related to higher technologies: Biotechnology; Electronics and Computer Engineering; Civil Engineering and Architecture; Mechanical Engineering; Software Engineering; Communications Technologies; ICTI; the Scientific Technological; Control Systems and Energy; Computerized Production Systeml Oceanography Systems; the Technology Sciences.

Students completing the necessary requirements may choose to continue their studies for another two years (13th and 14th grade) thus receiving a diploma of Practical Engineer. Some institutions are entitled to provide in addition to such diploma an B.Sc. degree.

http://cms.education.gov.il/EducationCMS/Units/MadaTech/HinucMadaTech/Ticonim/MegamotTecnologeyot/Mavo_Megamot.htm (Hebrew) Bing English translation

Technology and Science Excellence Student Reserve

In 2010, the Minister of Education designed a strategic plan to strengthen science and technology studies. "Technology and Science Excellence Student Reserve" is a key project in this plan which sets the criterion for a high quality science and technology matriculation diploma. The criterion consists of three exact science subjects of five point level (the highest level learned in an Israeli high school): 5 points in Mathematics; 5 points in one scientific discipline (Biology, Physics or Chemistry); and 5 points in an additional scientific or technological discipline.

While facilitating a solid knowledge base, this program is designed to identify and to nurture excellent students with high learning capabilities and outstanding persistence. This program presents a new approach by defining success of the Baccalaureate (matriculation) diploma by high quantity and quality standards. Analysis shows, that the program's goal of increasing the amount of students who complete high quality science and technology matriculation (Baccalaureate) diploma should rise from 6% to 14% within 3-5 years and reach 20% within 6-9 years, appears feasible

Such policy was grounded in a research paper jointly prepared by Dr. Ofer Rimon, head of the Science and Technology Administration in the Ministry and Dr. Dimitri Romanov head of the Central Bureau of Statistics: "Treading on diamonds: Israel's unrealized potential of excellence" (CBS Working Paper Series No. 67) and published in 2012 in parallel with the beginning of implementation of the program.

http://www.cbs.gov.il/www/publications/pw67.pdf at the Central Bureau of Statistica site (Hebrew, include English abstract in the final page

Reserve for Scientific and Technological Leadership at the Ministry of Education:

http://cms.education.gov.il/EducationCMS/Units/MadaTech/HinucMadaTech/Projects/Atuda/AtudaLemanhigutMadayit.htm Bing English translation

"Scientific and Technological Reserve" at the Ministry of Education site

http://cms.education.gov.il/EducationCMS/Units/MadaTech/HinucMadaTech/Hativot/Atuda/Atuda_MadaitTechnologit.htm Bing English translation

The program started in 2012 in 186 classrooms in junior high schools (7th grade) and 176 classrooms in secondary (high) schools (10th grade) and each subsequent year additional cohort classrooms entered the program. In 2015 the number of classrooms participating reached at Junior High Schools: 218 - 7th grade; 203 - 8th grade; 180 – 9th grade. At secondary (High Schools): 221 – 10th grade; 176 – 11th grade; 148 12th grade.

To achieve the program objectives the schools received additional resources: junior high schools received additional 2 weekly hours per student in mathematics, physics, computer science in each one of the age cohorts in the 7th, 8 th and 9 th grades. The secondary schools (high schools) received additional teaching hours, especially in mathematics, physics and technology. These additions were intended for splitting classrooms, provision of private lessons and increase the number of students who learn these disciplines and reduce drop outs. Both in junior as well as in high schools Excellence coordinators were identified in the schools, trained

and deployed. The additional resources package include additional equipment for junior high schools labs (for physics and robotics, for computer science); professional development courses for teachers, accompanying tutors and more.

TOV -Technician and Baccalaureate

The program TO"V (Technician and Baccalaureate) is a study track from the 9th grade till the 12th grade that provides students with the opportunity to be qualified and entitled both as Technician and get the Baccalaureate diploma. Such students will be able to complete an additional two year study track and be graduated as Practical Engineers with the possibility of continuing studies towards higher education degrees.

In the 9th grade they study the regular curriculum appropriate to such grade. In addition they receive 8 (eight) additional weekly hours of study to strengthen their qualification in: Mathematics, Science, English and Language (Hebrew or Arabic).

Up to grade 11th the students complete 14 study units. In grade 12th the students complete the requirements to get a Baccalaureate (completion of at least 21 study units) and the requirements for a Technician Certificate.

The goal of the project is to register each year at least 2,500 students who will complete successfully the entire program and receive both the Technician Certificate and the Baccalaureate.

Technician and Baccalaureate at the site of the Ministry of Education:

http://cms.education.gov.il/EducationCMS/Units/MadaTech/HinucMadaTech/Ticonim/Project_Tov.htm
Bing English translation

4a) Does your country have or plan to develop national/regional/local centres dedicated to supporting and improving STEM teaching and learning?

Yes

4b) Please indicate the name of the centre/s and describe their mission, remit and objectives, as well as any references to relevant reports/URLs/evaluation studies (remembering to indicate if they are only available in your national language or in English).

National in-Service Teacher Training Centre for Science and Technology in Primary Schools

This is the centre for training the scientific and technological leadership for primary schools and is located in the Tel Aviv University. The centre develops and carry ongoing in service professional development courses and workshops. It maintains a web site with relevant resources. The categories of Teaching Models presented include Education for Thinking, Investigation and Problem Solving; Teaching the private hours; Experiential Learning; Scientific and Technological Literacy. For each one of these models detailed support is provided for different grades and sub categories.

Main site: https://www.matar.tau.ac.il/ (Hebrew)

National in-Service Teacher Training Centre for Science and Technology in the Junior High School

http://tinyurl.com/sci-tech-hat Bing English translation

This centre was established in 2001 is under the academic responsibility of the Department for Science Teaching of the Weizmann Institute of Science and it operates in cooperation and the supervision of the Ministry of Education, the National Inspector and the Division for Curricula. A steering committee operates with representation of inspectors, other teacher centres, institutions that develop teaching/learning resources, and the Teachers' Colleges. The centre takes the initiative and supports regional activities and closely interacts with the Pisagot, local in-service teachers' support centres where workshops on Science and Technology for high schools take place. The centre organizes part of its activities: courses, seminars and special projects – split, in the centre and in the periphery.

Training programs for leading teachers and teacher educators are employed for their professional development. The purpose is to advance the program of significant learning of the concepts and principles of Science and Technology while integrating skills and capabilities for critical thinking and advance students achievements.

Presently the Centre took responsibility for a challenging project focused on Teaching/ Learning/ Evaluating (TLE) in cooperation with the inspectorate and the Administration for Science and Technology. In this framework it is developing 8 TLE kits. These kits will support the teacher in the planning and effective implementation of teaching contents and skills that are part of the curriculum while making them adequate to the characteristics of evaluation reflected in the national and international evaluation exams.

The National Centre for Mathematics Teachers in Primary Schools

http://ymath.haifa.ac.il/ Bing English translation

The mission of the Centre is to train, develop and nurture the leadership in Mathematics education in the primary school, to serve and contribute to the professional development of those who deal in this area. The centre also serves as the broad framework for professional relations with the relevant professional bodies through Israel.

The target population of the centre includes: instructors and professional coordinators; teachers and teacher educators; students and new teachers; the center support all the sectors: official, religious, Hebrew and Arabic speakers, regular and special education in all regions of the country.

The activities of the centre include courses and training program; visits of groups, counseling and guidance; seminars and conferences; concentration, elaboration and distribution of special learning resources for the Hebrew and Arabic sectors; publication of a professional journal on teaching mathematics at the primary school "Mispar Hazar 2000". The center runs a resource center with learning materials in Hebrew, English and Arabic; books and periodicals from Israel and abroad; curricula for the different grades; games; teaching supporting tools; student activity page; video cassettes.

The National Centre for Mathematics Teachers in Secondary Schools

http://highmath.haifa.ac.il/ Bing English translation

The mission of the Centre is to train, develop and nurture the leadership in Mathematics education both in the junior high school and in high schools in Israel. Three assumptions are at the root of the Centre operations: (1) Its activities match the objectives defined by the Ministry of Education and the inspectorate and are carried out in cooperation with them. (2) The Centre serves as a bridge between academic research on Mathematics education and the schools in Israel. (3) As a national centre we strive to expose and reflect the activities concerning Mathematics education in Israel and worldwide and bring them to the knowledge of the teachers.

New curriculum for Junior High School

http://highmath.haifa.ac.il/index.php?option=com_content&task=view&id=1591

Kesher Ham was the centre that up to 2012 served as National Centre for Secondary Mathematics education. It is called hosted by the Technion, Israel Institute for Technology. Following a tender it no longer serves as a National Centre but continue to run projects and activities in this area:

http://edu.technion.ac.il/inner10-5.php?LinkID=56 Bing English translation

The National Centre for Biology Teachers

http://www.bioteach.org.il/ Bing English translation

The National Centre for Biology Teachers operated in its first 19 years at the Hebrew University of Jerusalem, Department of Sciences Teaching. From 2014 the management was transferred to the Biology Team at the Department of Sciences Teaching in the Weizmann Institute in Rehovot. There is a branch of the Centre at the Technion (Israel Institute of Technology) that is focused on Environmental Sciences. Its purpose is to care for the professional development of Biology teachers while maintaining the connection of with academic developments concerning teaching the discipline and developing a teachers' community that share and support.

The centre has run a wide variety of training programs: for leading teachers, Bioda, BioHeker, BioSiur and others attending to demands from teachers in the field. Every summer the centre organizes a 3 day seminar with the top scientists in Israel who instruct the teachers on the latest developments; it organizes also an annual conference that is the annual meeting of the community of teachers who have the opportunity to contribute to each other in peer to peer workshops.

The National Centre for Chemistry Teachers

http://www.weizmann.ac.il/chemcenter/ Chemistry teachers forum (Hebrew)

The National Centre for Chemistry Teachers operates under the academic responsibility of the Chemistry Team of the Department for Sciences Teaching of the Weizmann Institute of Science (see: http://stwww.weizmann.ac.il/g-chem /) which participates in several international projects: PARSEL, PROFILES, TEMI, TEMPUS, ENGAGE and IRRESISTIBLE. The team develops, implement and evaluate learning resources for teaching chemistry in secondary education that are adequate to the Ministry of Education curriculum. Resources were developed for students and teachers and they include guides for teachers and additional resources like teaching software packages, educational games and films.

The Centre organizes training program, conferences and initiates special projects; it develops learning resources both in Hebrew and Arabic; it publishes and analysis of the Baccalaureate exams in Chemistry; since 2012 it also provides support for Chemistry teaching in the junior high schools; it supports a variety of Chemistry teaching applications and software packages; it seeks to connect the teachers with the cutting edge developments in Chemistry research and support them in bringing such resources to the classroom; and more.

Chemistry in the Network: a new program of cooperation of the National Inspector and the Davidson Institute will provide a **Virtual Classroom for those students interested in completing Chemistry as an specialization** part of their Baccalaureate diploma but their schools does not teach Chemistry. See: http://www.weizmann.ac.il/chemcenter/new_details.asp?id=96

The National Centre for Teachers of Physics

http://ptc.weizmann.ac.il/?CategoryID=1880 Bing English translation

The National Centre for Teachers of Physics was established in 1995 and operates in close cooperation and coordination with the Inspectorate for the teaching of Physics. It seeks to attend to the professional needs of the teachers and the assimilation of new national initiatives in this area. Its activities include: Development of

teachers' leadership able to lead changes in the system; development of a variety of resources for the use of the teachers; organization of training programs and seminars; operation of a didactic, interactive Web site for the teachers; production of "Tehuda" (Eco), the journal of the teachers of Physics; cooperation with a diversity of actors in Israel and abroad relevant for the teaching of physics.

Sites of the Inspectors national coordinators for the different STEM disciplines

In addition to the National Centres for Teachers in the STEM disciplines the National coordinating Inspectors maintain their own websites. Such sites are dynamic centres of interaction and provision of information for their respective teachers. They provide updates with relevant information: administrative, regulatory, and pedagogical and access to other relevant links like the Centres, the teachers online communities, resource centers, campaigns and more

Site of the Inspector national coordinator for Mathematics

http://cms.education.gov.il/educationcms/units/mazkirut_pedagogit/matematika/pinathamafmar/mavo.htm
Bing English translation

Site of the Inspector national coordinator for Chemistry

http://cms.education.gov.il/EducationCMS/Units/Mazkirut_Pedagogit/Chimya/ShulchanHamafmar/

Bing English translation Forum of Chemistry teachers Bing English translation

Site of the Inspector national coordinator for Physics

http://cms.education.gov.il/EducationCMS/Units/Mazkirut_Pedagogit/Phizika/

Bing English translation

Site of the Inspector national coordinator for Biology

http://cms.education.gov.il/EducationCMS/Units/Mazkirut_Pedagogit/Biology/PinatHamafmar/PinatMafmar.htm Bing English translation

Site of the Inspector national coordinator for Biotechnology

http://cms.education.gov.il/EducationCMS/UNITS/MadaTech/biotechnologia
Google English translation

Site of the Inspector national coordinator for Electronics and Computer Engineering

http://cms.education.gov.il/EducationCMS/Units/MadaTech/elecomp/

Bing English translation

Site of the Inspector national coordinator for for Mechanical Engineering

http://cms.education.gov.il/EducationCMS/Units/MadaTech/SystemEngineering/

Bing English translation

Site of the Inspector national coordinator for Information and Communication Technologies (ICT)

http://cms.education.gov.il/EducationCMS/Units/MadaTech/Tikshuv/

Bing English translation

Site for the Scientific Technological strands:
Engineering Sciences, Generalized Technology): Aerospace, Algorithms, Analogies, Biomedical engineering, Electronic system, Robotics.

http://cms.education.gov.il/EducationCMS/Units/MadaTech/MadaitTechnologit/

Bing English translation

Site for the Control and Energy strand

http://cms.education.gov.il/EducationCMS/UNITS/MadaTech/energy

Bing English translation

The Division for Information Technologies

http://sites.education.gov.il/cloud/home/Pages/default.aspx Bing English translation

Learning Management System of the Division for Information Technologies

http://online.lms.education.gov.il/ Bing English translation

Instruction on Computing and Information Competencies – a selection of activities for primary schools and junior high schools

http://online.lms.education.gov.il/course/category.php?id=54 Bing English translation

PISGA – Centres for Professional Development of Teaching Staff

http://tinyurl.com/pisagot Bing English translation

PISGA: Circular of the Director General of the Ministry of Education Bing English translation

The role of the Centres is to care for the professional development of all teaching staff throughout their entire career. Presently there are 56 such centers in Israel and all teachers of the country are members. The regional Pisga centres are professional pedagogical institutions that operate following up to date conceptions in a variety of way for the empowerment and development of the staff; they integrate a national system concept with the need to adapt to the local conditions in different towns and municipalities.

5a) Does your country have or plan to develop any specific campaigns, competitions, special days/ weeks aimed at motivating young people to study STEM subjects and pursue STEM careers?

Yes

5b) Please provide details as well as any references to relevant reports/URLs/evaluation studies etc. (remembering to indicate if they are only available in your national language or in English).

Ten Hamesh / Give Five

On September 1st 2015 with the opening of the school year the Minister of Education launched the campaign called in Hebrew Ten Hamesh. The purpose of the campaign is to double in five years the number of students in secondary education that choose to study the intensified program for Mathematics (5 units for the Baccalaureate).

The program includes the recruitment of Mathematic teachers among hi tech professionals; the establishment of smaller classes; support for Virtual Classrooms for students whose schools do not offer a 5 units program in Mathematics (mainly schools in periphery regions unable to recruit adequate teachers) and more. Among other measures the minimal number of students in a 5 Units Mathematics class was reduced from 15 to 6. The yearly investment in this program is expected to be 75 million NIS (about 17 million Euro) a year. The launching of the program is accompanied by an intensive publicity campaign for which the Ministry mobilized the popular last president, Shimon Peres, who is well known for his enthusiasm and support for high technologies development. The president appears in the campaign sitting in a classroom and studying Mathematics.

See: http://edu.gov.il/sites/special/5/Pages/Five.html Bing English translation

The Biology Olympics is a competition for outstanding students who learn Biology have been taking place since 1998. It is an initiative of the Inspectorate for Biology and takes place at the Bar Ilan University. Hundreds of students from all regions of the country and from all sectors take part. The competition includes a variety of evaluation approaches: written exams in which students need to show understanding of a segment of a research report; application of previous knowledge and mastery of research competences; presentation of a summary of research through a scientific poster; and oral exam in which an independent research project by the student is evaluated. The Olympics is a lever for advancing Biology both at the school as well as at the national level.

Poster competition on the subject of “Healthy Way of Life” (2012) (Hebrew)

http://cms.education.gov.il/EducationCMS/Units/Mazkirut_Pedagogit/Biology/PeiluyoHoraa/briut.htm

Mathematics

The National Conference on Mathematics Education in Primary School 2.7.2015

http://ymath.haifa.ac.il/index.php?option=com_content&view=article&id=1102&Itemid=45
Bing English translation

Mathematics Marathon in preparation for the Baccalaureate exams

http://cms.education.gov.il/NR/rdonlyres/072E70BD-A669-4D51-BF39-FCF332CD54DB/171624/maraton.pdf

Biology

Biology Olympics

http://cms.education.gov.il/EducationCMS/Units/Mazkirut_Pedagogit/Biology/Olimpyada/Patich_laolimpiyada.htm Bing English translation

http://cms.education.gov.il/EducationCMS/Units/Mazkirut_Pedagogit/Biology/PeiluyoHoraa/KrazotBriut.htm

Teachers photograph the Nature on the 60th anniversary of the State of Israel

http://cms.education.gov.il/EducationCMS/Units/Mazkirut_Pedagogit/Biology/PeiluyoHoraa/MorimMatzalmim.htm First Album Second Album

Environmental Sciences

Environmental Researchers

Competition organized by the Ministry of Education, Ministry of Environment, the Davidson Science Teaching Center at the Weizmann Institute, Keren Kayemet and the Malraz NGO. This is a competition between students who are preparing research projects in Environmental Sciences (EcoTop). The best projects are selected and invited to present a Scientific Poster before judges from the Universities and their peers.

Environmental Research under the Lens of the Camera

This competition runs in parallel to the first one. This is a photography competition with a new theme each year. In 2015 it was "The atmosphere and coping with climate change"

http://cms.education.gov.il/EducationCMS/Units/Mazkirut_Pedagogit/MadaeHasvivva/Prasim/HokrimSviva2015/chokrimsviva4.htm Bing English translation

Competition for Final High School Research Projects in Environmental Science

This competition awards excellent final research projects in all disciplines – Environmental Sciences, Physics, Chemistry, Arts, Geography, Biology etc. – which deal with issues related to the Environment and sustainability.

http://cms.education.gov.il/EducationCMS/Units/Mazkirut_Pedagogit/MadaeHasvivva/Prasim/AvodatCheker/tacharutavodotbenguryon2015.htm Bing English translation

Water Award: competition "Stockholm Water award" for Israeli youth

Examples of projects for the competition: The influence on the quality of water of the location of dairy barns; Employing plants/ animals for water purification; The Eilat coral reefs. Prizes include travel and hosting in Sweden for the teacher and the winner in the world competition and participation in the Water week; bourse for studies in the Tel Aviv University.

http://cms.education.gov.il/EducationCMS/Units/Mazkirut_Pedagogit/MadaeHasvivva/Prasim/PrasAmayim/

Young Reporters for the Environment

Young Reporters for the Environment (YRE) is a network of international youth engaged in environmental journalism and Education for Sustainable Development. In the last competition carried out in Israel by the Ministry of Education there were 89 entries and four got awards for first and second places in the written and films categories.

http://cms.education.gov.il/EducationCMS/Units/Mazkirut_Pedagogit/MadaeHasvivva/Prasim/katabeysviva.htm Bing English translation

Chemistry

Competition in cooperation with the Chemistry Industry: We have Chemistry

http://cms.education.gov.il/EducationCMS/Units/Mazkirut_Pedagogit/Chimya/Eruaim/taasiya/

http://stwww.weizmann.ac.il/g-chem/learnchem/ Bing English translation

The ChemiAda: the National Chemistry Olympics

http://cms.education.gov.il/EducationCMS/Units/Mazkirut_Pedagogit/Chimya/Eruaim/chimiyada/

Bing English translation

The International Chemistry Olympics

http://cms.education.gov.il/EducationCMS/Units/Mazkirut_Pedagogit/Chimya/Eruaim/olimpiyada/olimpic.htm
Bing English translation

Visits and tours in universities and industry

http://stwww.weizmann.ac.il/g-chem/learnchem/main.asp?PageKind=4&ID=01

http://cms.education.gov.il/EducationCMS/Units/Mazkirut_Pedagogit/Chimya/ShulchanHamafmar/HachsharatMorim/ChimyaVeHandasa.htm Bing English translation

Campaign promoting the study of Chemistry in schools

http://www.weizmann.ac.il/chemcenter/Page.asp?id=20

Academy in the network

Online lectures from experts from the Universities, the industry and medicine for teachers and students

http://www.weizmann.ac.il/chemcenter/Page.asp?id=22

Physics

The National Olympics of Physics is organized by the Inspectorate of Physics in the Ministry of Education; Technion, Israel Institute of Technology; Ben Gurion University of the Negev; The Ilan Ramon Center for Youth Physics' seekers. The first stage takes place in May in 10 regional centres around the country. About 400 participants from the first stage are invited to the second in whom 40 of them are selected and participate in a Youth Camp in the summer that takes place in the Technion. At the end of the camp 18 are announced as candidates for participation in the International Physics Olympics. During the school year they get additional preparation through periodical counseling meetings and much home work. At the end of a year of preparation they are invited for an additional Youth Camp of a week that takes place in the Spring at the Ben Gurion University; eight candidates among them are chosen to represent Israel in the International Asia competition. Five representatives (and additional one as reserve) are chosen among them to represent Israel in the International Physics Olympics (in July) is chosen after the Asia competition.

See: http://www.ipho.org.il/ (Hebrew)

Technological

BioTech Research Project

This is a research project for grade 11th (one Baccalaureate unit) that is carried out in a research institute or industrial plant in coordination with the school laboratory. This is an experiential and challenge meeting with Biotechnology providing the students with an opportunity for practical and active learning while coping with a real life applicative research challenge. ICT is an integral part of the environment in which the project takes place. The evaluation is carried out by the teacher and an external examiner.

http://cms.education.gov.il/EducationCMS/Units/MadaTech/biotechnologia/ProyektCheker/

Bing English translation

Projects Competitions of the trends Electric and Electronic Engineering and Control Systems

and the trend of Mechanical Engineering

http://cms.education.gov.il/EducationCMS/Units/MadaTech/elecomp/EirueimVtacharuiot/Events.htm
Bing English translation

Robotics competitions

Students from Israel participate very successfully in several national and international Robotics competitions including Robonet, FIRST, FLL, FRC, The world robotics championship

The Ministry Robotics site: http://cms.education.gov.il/EducationCMS/Units/MadaTech/Robotica/

Bing English translation

Competitions

Robotics

http://cms.education.gov.il/EducationCMS/Units/MadaTech/HinucMadaTech/MeidaPirsumim/EruimBamegamot/tachroyot_robotika.htm Bing English translation

System Engineering (Mechanical Engineering)

http://cms.education.gov.il/EducationCMS/Units/MadaTech/SystemEngineering/Peiluyot/tacharut/

Bing English translation

MUTAV - Science and Technology in Society (for All)

The inspectorate for Science and Technology in Society runs a fair named Tozar-Ieda (Product of Knowledge) every year. In the last fair 35 teachers and 226 students presented the product of their studies in which they developed group projects that are part of the portfolio used to evaluate their achievements. Participate in the fair only those students whose work fulfill the criteria that is published in advance.

http://cms.education.gov.il/EducationCMS/Units/Mazkirut_Pedagogit/Motav/Mischakyeda/kenesTotzaryeda.htm Bing English translation

The 4th National Fair for Scientific Investigative Projects and Problem-Solving

http://cms.education.gov.il/EducationCMS/Units/MadaTech/HinucMadaTech/MeidaPirsumim/yarid_mada_arzi_2015.htm Bing English translation

The Inspectorate for Science and Technology of the Ministry of Education at the initiative and leadership of its Chief Inspector and director of the area of Sciences carries out a national program for Enquiry Based Learning in the area of Science and Technology. The students carry out an investigative scientific project with experiential and observational elements, or as a technology investigation with the purpose to solve an explicit problem. The present their learning process, the knowledge and the skills they acquired through a research report and a scientific poster. This program has been carried out with much success in the last five years and has had wide repercussion throughout the whole country.

This national investigative process is a central element in the array of special programs that seek to promote significant learning in this area and to encourage students to choose STEM disciplines in their secondary education. The process of investigation and problem solving encourages team work, creative thinking, care, feelings of empowerment and a deep understanding of phenomena and scientific processes. The months that precede the national fair, students – boys and girls, grades 6th , 8 th and 9 th from all over the country have experience with investigative processes and problem solving supported by teachers, instructors and experts. The products of their work are exhibited in a school fair and selected projects are chosen to be presented at fairs at the town, regional and sectors levels. Those selected projects that provide the best examples of investigation and problem solving and are very in innovative and creative for the students are chosen by a team of judges from the Ministry of Education, from the universities and from the industry to represent the different regions at the National Fair that takes place each year in a festive event in the Givat Ram campus of the Hebrew University of Jerusalem.

Space related campaigns planned and carried out jointly by the Ministry of Education and the Ministry of Science, Technology and Space

The two ministries work together in matters related to Space education and in the last year have established a very well structured work programme that has its own yearly calendar. For the upcoming school year 2015/2016 this programme include 20 events including : The Younger Space Olympics ; support for the students in the Scientific and Technological Reserve program for research work on Space and Physics by engineers from the Israel Aircraft Industry – Mabat Space ; quizz on Space and Astronomy ; the Israel Space Week with many events ; experiential activities related to Space in the Science Museums ; integration of Space related subjects in the teacher training activities carried out in the diverse regions ; integration of Space related subjects in the courses of educational leadership in the primary and junior high-schools; integration of Space related subjects in the in-Service training programs for teachers of the Scientific Technological Reserve program (30 hours) ; Conference on Education and Space ; visit of students in the International Astronautics Conference ; teacher training programs on Space ; lectures and meetings in schools with senior officers and scientists from the Israel Space Agency and the Space industry ; Space summer camp ; experiential workshops for students from Junior High Schools at the International Astronautics Conference.

The Israel Space Week

The Israel Space Week is a cooperative initiative involving the Ministry of Education, the Pedagogical Secretary, the Inspectorate for teaching Science and Technology ; the Ministry of Science, Technology and Space ; the Israel Space Agency ; and the Ramon Foundation. Its purpose is to strength the community relations with Space related matters and increase the curiosity of young people concerning Space activities in Israel. It takes place every year at the last week of January.

See : http://cms.education.gov.il/EducationCMS/Units/MadaTech/HinucMadaTech/Hativot/LimudayChalal/spaceweek2015.htm Big English translation

The Ilan Ramon national quiz on Space and Astronomy

This campaing is produced by the Israel Center for Excellence through Education

http://cms.education.gov.il/EducationCMS/Units/MadaTech/HinucMadaTech/Yesodi/LimudayChalal/hidon_ahalal.htm

http://www.excellence.org.il/Index.asp?CategoryID=1042

Bing English translation

The Ramon Olympics on Space

The Ramon Olympics on Space is an activity that nurtures scientific and technological excellence through competition. Teachers of Science and Technology in Junior High Schools lead activities with the purpose to deepen the understanding on subjects related to the research of Space and the Universe. The Olympics include participation in an online quizz and solving problems at the cutting edge of scientific inquiry. The quizz, the problems and the products from the work of the students can be observed at the Web site of the competition. See :

http://cms.education.gov.il/educationcms/units/madatech/hinucmadatech/meidapirsumim/kenes_olymp.htm
Big English translation Competition site (Hebrew)

The Ramon Conference on Education and Space

http://cms.education.gov.il/EducationCMS/Units/MadaTech/HinucMadaTech/MeidaPirsumim/keneshalal.htm
Bing English translation

This event (January 2015) is part of a campaign to advance interest in Space studies among students in primary and junior high schools. It is a joint program of the Ministry of Education, the Ramon Foundation and the Ministry of Science, Technology and Space. The participants met the astronaut Nicole Stott and heard how she became the first mother in space. They visited the planetarium and the exhibition of students works in the framework of the strategy for teaching and learning on space; they heard fascinating lectures on particles accelerators; space games; how to build a satellite and send an experiment to space; what is the Rosetta mission.

The Israel Competition for Young Scientists and Young Developers

A competition that is part of the events of the national Science week that takes place near the date of the anniversary of Albert Einstein (March, 14th). The competition showcases the best scientific and technological achievements of Israel youngsters. Scientific and engineering projects carried out in the last year by students from all regions of the country in different frameworks: final projects for the Baccalaureate; final technological projects; and a variety of personal projects.

The competition is part of the RTD Framework Programme of the EU to stimulate the connection and collaboration between young scientists from Europe and is also part of the prestigious competition Intel- ISEF (Engineering Fair & International Science). The winners in the competition represent Israel in international competitions in Europe and the United States and receive scholarships for their studies at universities in Israel.

http://www.mada.org.il/young/about Site of the Ministry of Education

Bing English translation

Conference of the Scientific Technological Reserve

The conference took place in January 2015 and was the occasion to present data and findings concerning the program after three years of operation. Outstanding schools participating in the program were awarded a certificate. A panel of principals of schools taking part in the program discussed its advantages and challenges.

http://cms.education.gov.il/EducationCMS/Units/MadaTech/HinucMadaTech/MeidaPirsumim/kenes_atuda_01_2015.htm Bing English translation

5Pi2 (5 X 2)

This is a broad initiative whose main objective is to double the number of students in Israel completing an excellent Baccalaureate in STEM (5 units in three STEM disciplines) led by the Ministry of Education. It seeks to mobilize leading institutions from the public, business and social sectors and establish a joint platform of operation; establish a strong motivation for implement common agreed tasks; development of a joint policy.

The institutions who took the initiative and are supporting it include the Rashi Foundation; Intel; SunDisk; World ORT; Kadima Mada; Trump Foundation and lately were joined by Microsoft. The broader network includes about 100 representatives with additional actors including the Ministry of Defense, the IDF, the Local Authorities (municipalities) and with them universities, schools networks, Science Museums, educational organizations and philanthropies. A business coalition includes 10 of the leading hi tech companies in the country. The backbone organization is Sheatufim (NGO) with experience in social management.

http://www.5p2.org.il/

The Ministry of Science,Technology and Space

Support for RTD Regional Centres in Peripherial Regions

The Ministry provides support in partnership with local authorities for eight regional RTD centres: Knowledge Centre Kyriat Shmone, Meigal; Research Centre Golan (Katzrin); The Galil Association (Shefaram); The Triangle RTD (Kfar Kera); RTD Shomron and Jordan Valley (Ariel); RTD Yehuda (Carmel Village); RTD Katif (Regional Council Negev Fields); RTD Dead Sea (Regional Council Tamar and Regional Council Megilot). Their purpose is to establish a local knowledge basis as ground for the social and economic development in peripherial regions; stimulate cooperation between researchers in established institutions with researchers based in the periphery; to expose Science to the community through the RTD Centres; cooperate with the educational system in advancing study of STEM disciplines. See:

http://most.gov.il/CenterMofArea/Pages/mop.aspx Bing English translation

Space Centres

Enrichment for non formal educational activities in the community in Astronomy and Space. The purpose is to strengthen the interest of children and youth in Space matters so as to engage their natural curiosity concerning this area in a way to deepen their knowledge. Centres were established in the local authoritie Taibe and Yarka from the non-Jewish sector and are a focus for collaboration with regional educational institutions. See: http://space.gov.il/#Educators

Support for Professional Competitions

- See above for Space related activities jointly promoted by the Ministry of Science, Technology and Space with the Ministry of Education

- FRC – First Robotics Competitions. Joint project of the Ministry with the Technion, Israel Institute of Technology. “Israel First” carries out a national competition for robots building. See: http://www.firstisrael.org.il/

- Man and the Sea. Joint project of the Ministry with the municipality of Herzlyia. The Herzlyia Science Centre operates a non formal education national program engaging youth in oceanography related Sciences, technologies and environmental issue.The project carry out also a national competition for the development of projects in this area.

- Space competitions. Program to deepen the interest of children and youth in Space related matters. A national competition is carried focusing on research tasks, from the proposition of initial ideas and suggestions up to the completion of a mode. See: http://space.gov.il/#Students

Circles of Study of Science

The has a program in which it issues periodically tenders designed to support activities to be carried out by local authorities to stimulate interest in Science. It supports activities like learning circles, workshops, and courses for youngsters from the 6th to the 12th grade. The activities include lectures, demonstrations, experiments in disciplines like Mathematics, Physics, Engineering, Robotics, Computers and Cyber. This activity is intended to increase the knowledge, develop scientific and technological thinking capabilities, and to increase the motivation of the young people to excel in these disciplines.

Circles of Study on Space, Satellite Workshops, Excellence in the technological schools networks

A variety of activities are carried out related to Space and Satellites including Circles of Study for experiential activities with children; Workshops in the school framework dealing with building Space Satellite models; a program of courses in Space related Sciences at the technological schools networks including lectures, demonstrations and experiments (Grades 7th to 12th).

Summer Science Camps
The Ministry support Summer Science Camps for children from the 1st grade up to the 6th. The camps include demonstrations and active involvement in experiments. The camps take place in regions of national priority and in peripherial regions.

Mahar Program – (Science and Space and Robotics)

Program for training in computers and robotics for the Arab sector. Carried out in cooperation with the YTEC Company and whose purpose to stimulate youngsters to be integrated in Scientific learning and research through the academic studies and participation in the technological development system of the country. Another relate program is NETA for the Arabic Society carried out with the non-profit associationTAPUAH seeking to traing youngsters sot hey are able to be memb ers of the youth technological organization NETA.

I and the Seaweed will change the world

Joint program of the Ministry with the Ecological Greenhouse Ein Shemer with the purpose to encourage non formal learning by youngster in the disciplines of Environment Sciences, Technology and Agriculture, Biology, Chemistry.

See: http://most.gov.il/ScienceAndCommunity/Pages/hugim.aspx Bing English translation

Additional campaigns :

Education for Sustainability

Campaign of the Ministry of Protection of the Environment targetting young persons

http://www.sviva.gov.il/subjectsEnv/Education/Pages/default.aspx

Bing English translation

Energy with an alternative head

ICT based learning environment including eBooks to promote interest in technologies related to energy. Campaign developed by the Ministry of Energy for Grades 7th to 9th

http://energy.gov.il/Learning/ClassesZnTeit/Pages/Default.aspx (Hebrew)

Young seekers of water and knowledge

Campaign of the Ministry of Economy to encourage interest of youth people in technologies related to the water

http://israelnewtech.gov.il/Activities/Pages/hiteach.aspx Bing English translation

Google Lunar Xprize – SpaceIL

Space IL was established in 2011 whose purpose is to land an Israeli satellite in the moon. It carries out several educational activities targeted at teachers, youngsters and children.

http://www.spaceil.com/he/edu-content/spaceil-conducts-a-successful-workshop-for-physics-teachers/

http://www.spaceil.com/he/spaceil-kids/

Bing English translation

Tablet with Sensors for every teacher of Science and Technology

This is a campaign being carried out by the Athena Fund with the Teachers' Syndicate

https://www.itu.org.il/?CategoryID=119&ArticleID=20447

http://www.athenafund.org/?categoryId=10236

Bing English translation

Cooperation between the Inspectorate for Science and Technology and the Science Museums

The Ministry of Education, the Inspectorate for Science and Technology took the initiative to increase experiential learning in Science and Technology studies. This initiative is carried out in cooperation with Local Authorities (municipalities) and the Science Museums of Israel and its target are the teachers of Science and Technology

and the students from primary and junior high schools. The purposes of the program are : (1) Strengthen teaching of Science and Technology at the primary and junior high schools (2) To ground the knowledge and understanding of phenomena, principles, processes, and concepts in Science and Technology as appropiate for the curriculum and its main milestones. (3) To leverage the central experiences (about 10 key experiment in each grade) through hands-on experiences.

The experiences are integrated with activities in one of the recognized Science Museums : the Bloomfield Science Museum Jerusalem ; the Weizmann Science Institute in Rehovot ; the Madatech in Haifa ; and the Carasso Park in Beer Sheva. The students have preparatory experimental activities at school before the activities in the Museum ; then they have a summarizing session when coming back to school. The subjects include : Space ; Electrical energy ; Sound energy and technological systems ; Forces ; Interactions and more. The teachers of Science and Technology receive guidance from the Inspectorate and from the Museum team and structure together with the Museum team the appropriate activities for their classes. This program is followed by and evaluation procedure.

Bloomfield Science Museum Jerusalem

The Bloomfield Science Museum Jerusalem has a cooperation agreement with the Ministry of Education to produce a wide variety of activities and fairs for advancing the interest of children, youth and the wider public in STEM. It has a cooperation agreement with the Ministry for carrying out annual competitions and fairs.

https://www.mada.org.il/education (Hebrew) English site: http://www.mada.org.il/en

Call for participation in the Competition for Young Scientists and Developers in Israel 2015 (Hebrew)

http://cms.education.gov.il/NR/rdonlyres/963C2821-B162-476B-B83C-64545E8EBD39/193818/kolkore_.pdf

C NATIONAL CURRICULUM AND ASSESSMENT REFORM:

6a) Has there been any recent, ongoing or planned curricular or assessment reform since 2012 affecting STEM school education in your country at primary or secondary level?

Yes

6b) Please provide details as well as any references to relevant reports/URLs/evaluation studies etc. (remembering to indicate if they are only available in your national language or in English).

Adapting the disciplinary curricula to the national policy for significant learning

http://cms.education.gov.il/EducationCMS/Units/Mazkirut_Pedagogit/AgafPituachPedagogi/TochniyotLimudim/hatama_tochnit.htm Bing English Translation

The purpose of the national policy for significant learning is to advance deep learning that encourages active experiential learning, team work, thinking and research and prepare the learner to cope with the challenges of the 21st Century. Significant learning is grounded in three principles: value for the learner and for society; involvement of the learner and the instructor; relevancy for the learner. These principles are expected to be assimilated and integrated in the operation of the whole educational system, studies organization and teaching processes, learning and evaluation, while empowering the school autonomy beginning from school year 2014/2015. The assimilation of this policy involves processes in three areas that must be carried out simultaneously: (1) adapting the present curricular and learning resources development; (2) teachers' training and professional development; (3) adapting the processes of evaluation.

The above mentioned page provides links to documents (inHebrew) that detail this policy for diverse target populations: for the wide public; for inspectors, curriculum officers, and discipline committees; for officers in the Ministry, in the MoE districts and for educational institutions. The following presentation describes the process of implementation of the new curricula in the secondary schools:

Adapting the curricula in the different disciplines in secondary education in the school year 2014/2015:

http://cms.education.gov.il/NR/rdonlyres/354EF69E-CFE3-425F-9FD1-D58618D88B1F/190152/resource1.ppt

A curriculum that has been adapted to the national policy of significant learning has undergone: (1) Adequacy between the amount of contents and the number of teaching hours (2) Division into two parts: (2a) the basics of knowledge and capacities (70%) (2b) Deepening and widening of the subject (30%) (3) Integrations: the curriculum integrates guidelines, recommendations, highlights that advance significant learning in the discipline. The following table (from the above presentations) summarises the division:

Component → Parameter ↓	Component (1) of basic knowledge and capacities	Component of (2) deepening and widening
Essence	Core of knowledge common to all learners	Enrichment, diversity, adapted to the needs of the students
Quantity	70%	30%
Learning obligation	Full	Partial (depending on the level of deepening)
When learning takes place?	The school directors will determine what will be learned each year and how the teaching hours will be distributed in each discipline	
Kind of learning	Significant learning	Significant learning
Teaching, Learning, Evaluation	Traditional while integrating a variety of didactic means like: debates, public trial, dialogue and so on.	Alternative: PBL, learning through research that result in a report and so on.

Complementary information concerning the table above. From the office of the National Inspector for Science and Technology the following complements were suggested :

1. When learning takes place ?
   The director has 30% of pedagogical flexibility although the allocation of teaching hours is carried out following the guidelines of the Ministry called Matana (Management, planning and preparedness Kit) - See (Hebrew) : http://cms.education.gov.il/EducationCMS/Units/MinhalPedagogi/matana/2015.htm
2. Teaching, Learning, Evaluation
   There is need to mention to the process of investigation and product oriented teaching – scientific poster, model and so on. This takes place both in the traditional evaluation this is part of the core and also in the alternative evaluation model.

The curricula adapted for significant learning in STEM for primary and junior high schools are available in the following links:

Science and Technology for Primary Schools

http://cms.education.gov.il/EducationCMS/Units/Tochniyot_Limudim/science_tech/MeudkenetYesody/Tal.htm
Bing English translation

The “Science and Technology Studies” curriculum from 1996 was updated in 2011 with a new emphasis on higher thinking processes. The purpose of this policy remains “Science and Technology Education for all the student population” seeking to train active citizens able to contribute to the society functioning and growth.

The guidelines for updating the curriculum) from January 2012 (indicate that structuring of thought processes and skills should be integrated with the content areas as a spiral in varied learning environment along the study years .This structuring should be implemented both in individual and collaborative learning according to the capacity and readiness of the student in terms of his awareness ,his motoric and communicative competences.

The director has 30% of pedagogical flexibility although the allocation of teaching hours is carried out following the guidelines of the Ministry called Matana (Management, planning and preparedness Kit) - See (Hebrew) : http://cms.education.gov.il/EducationCMS/Units/MinhalPedagogi/matana/2015.htm

Thought processes expected to be developed in the curriculum" Science and Technology Studies "are grouped in three categories:

- The scientific investigative process (Sciences – physics, chemistry and biology)
- The design process (Technology)
- Nurturing the development of information seeking and processing skills (Science and Technology)

See" :Area of competencies / thinking processes) "24.1.2012 .(From the Ministry of Education site

http//:meyda.education.gov.il/files/Tochniyot_Limudim/Mada/Cheker.pdf

See also:

"Competencies of Thinking and Learning" . From the Ministry of Education site:

http://cms.education.gov.il/EducationCMS/Units/Tochniyot_Limudim/Portal/Kishurim/Chashiva.htm

Bing English translation

The updated (draft) curriculum for the school year 2015/2016 was adapted through 2014/2015 to make it adequate to the stated purposes of the policy on the Ministry on "Significant Learning" i.e. the development of Higher Thinking and Learning Capabilities. The emphasis is on stimulating active and experiential learning, work in team, deep thinking, investigative processes and problem solving. To achieve these goals the contents were reduced by 20% ; the curriculum distinguishes between a core of knowledge and capacities and additional element of deepening and expansion of the subjects studied.

Program of Studies in Science and Technology at the Primary and Junior High School

Updated curricula – draft versions for the school year 2015" from the Ministry of Education Site:

http://cms.education.gov.il/EducationCMS/Units/Tochniyot_Limudim/science_tech/MeudkenetYesody/Tal.htm
Bing English Translation

The "Science and Technology" curriculum for the Primary School, grades 1st through 6th is available here (Hebrew). It includes the contents to be taught in each one of these grades and details also the Investigative Skills (updated 1/2012); the Design Skills (updated 6/2011); and the Information Seeking and Processing Skills (updated 6/2011) to be taught.

The detailed "Science and Technology" curriculum for the Junior High School, grades 7th, 8th and 9th is available here (Hebrew). This same site include the relevant supporting resources: Policy guidelines; approved books; presentations, activities, observations and experiments developed by teachers; evaluation tasks; multimedia resources; Web sites.

Bing English translation

Science and Technology for Junior High Schools

http://cms.education.gov.il/EducationCMS/Units/Tochniyot_Limudim/science_tech/TochnitMeodkenet/chatab.htm

Agricultural sciences (Primary)

http://cms.education.gov.il/EducationCMS/Units/Mazkirut_Pedagogit/Chaklaut/YesodiVchativa/Tochnit_Yesodi.htm

The curricula adapted for significant learning in STEM for secondary schools are available in the following links:

Biology

http://cms.education.gov.il/EducationCMS/Units/Tochniyot_Limudim/Biologic/Mavo/Tal2014.htm

Chemistry

http://cms.education.gov.il/EducationCMS/Units/Mazkirut_Pedagogit/Chimya/ThochniyotLimudimChadasha/Tochnit.htm

Agricultural Sciences (Secondary)

http://cms.education.gov.il/EducationCMS/Units/Mazkirut_Pedagogit/Chaklaut/Chativa_Elyona/TochnitLimudim.htm

Environmental Sciences

http://cms.education.gov.il/EducationCMS/Units/Mazkirut_Pedagogit/MadaeHasvivva/TochnitLimudimChadash/Tal2014.htm

Geo Sciences

http://cms.education.gov.il/EducationCMS/Units/Mazkirut_Pedagogit/AgafMadaim/tochniyot/KadurHaaretz.htm

Science and Technology in Society

http://cms.education.gov.il/EducationCMS/Units/Mazkirut_Pedagogit/Motav/Haracha/TalTashah.htm

Physics

http://cms.education.gov.il/EducationCMS/Units/Mazkirut_Pedagogit/Phizika/TochnitLimudim/tochnitlimudim.htm

Mathematics

http://cms.education.gov.il/EducationCMS/Units/Mazkirut_Pedagogit/Matematika/ChativaElyona/TalTashah.htm

Strategy: New curriculum for Mathematics in Secondary schools

The Committee for the Discipline of Mathematics gave its preliminary approval for a new curriculum of Mathematics for the Secondary schools (High Schools). The curriculum draft was sent to the universities to get their observations and it will then be revised. The authors of the new curriculum are Prof. Ran Livneh from the Hebrew University and Prof. Roza Leikin from the University of Haifa who heads the Discipline Committee. The proposed changes come from a critique of the present situation in which the main focus is preparation for exams; instead the study of Mathematics should educate for understanding, explanation, argumentation and choosing strategies.

The curriculum for students who choose 3 units will provide basic mathematics literacy and applications in everyday life like financial applications and budget management. It will have three clusters: society and science; financial economic; getting around in space.

The level of 4 units will be adequate for students intending to study Humanities or Social Sciences at the university. In contrast to the present program it will not be a downsized 5 units program but a unique curriculum. It will stress statistics and its main purpose is to stress the relevance of mathematics and its insights for understanding the world.

The level of 5 units targets those students who intend to continue their studies in mathematics-intensive professions like sciences and engineering. It will be a bit easier than the present program but will stress on significance and will diminish the difficulty of Algebra; it should also educate to scepticism and critical thinking. In contrast to the 10% of students who choose 5 units the Ministry of Education expects that about 10% will choose 5 units.

In addition to these level a new level of 5 units plus plus (7 units) will be introduced and targeted to those students who love Mathematics. In addition to the 5 units program they will study the historical background of Mathematics, will read texts and will receive challenging puzzles and investigation/discovery tasks. This level is expected to cater only to 5% of the students.

See: “5 Units Plus Plus: a new curriculum for Mathematics in secondary education was approved” by Yard Scop, Haaretz,1.4.2015

http://www.haaretz.co.il/news/education/.premium-1.2604807 (Hebrew)

Assessment Reform

The body in charge of assessment in the educational system in Israel is the National Authority for Measurement and Evaluation in Education (RAMA). This is an independent body established by an special law that reports directly to the Minister of Education. See:

http://cms.education.gov.il/educationcms/units/rama/odotrama/odot.htm

Bing English translation

The key tools for assessment in the educational system in Israel are the Meitzav and the Baccalaureate (matriculation) exams.

Meitzav (School indicators of efficiency and growth)

Meitzav (School indicators of efficiency and growth) is a set of exams and surveys carried out by RAMA in primary and junior high schools in the disciplines: Science and Technology; mother language (Hebrew or Arabic); Mathematics; and English. Its purpose is to provide the school directors objective pedagogical information concerning their schools that they then can employ to build their work plan and improve teaching and the school organizational climate. The results for individual schools were not published and only aggregated at the national, regional and sectorial levels to avoid unfair comparisons between schools and other negative effects. However in 2012 following a Supreme Court ruling requested on basis of the Freedom of Information Law the results for individual schools was published.

http://cms.education.gov.il/EducationCMS/Units/Rama/Meitzav/ English Bing translation

In the school year 2013/2014 no external Meitzav examinations were carried out. All the primary schools and high schools received the exams for internal use (Internal Meitzav). However the survey for School Climate and Pedagogical Environment were carried out as external assessments. RAMA established a committee headed by its CEO to consider alternative assessments models. Following its recommendations the Minister and the Ministry Director General decided to re-continue the applications of an updated Meitzav.

The basic assumption that guides the development of the Meitzav indicators is that the school is a complex weave of learning environment, contents and skills, pedagogical approaches and attitudes, educational values, relationships between different actors and more. The updated Meitzav will continue to include a Standard External Evaluation (External Meitzav) and Internal Qualitative Evaluation (Internal Meitzav). In contrast to previous year the Internal Meitzav will be optional and the decision whether to carry them will depend on the judgment and exclusive decision of the schools directors. The exception is the exam for Mother language that will take place every year for ALL the students in the 2nd Grade.

Baccalaureate Examinations

http://cms.education.gov.il/EducationCMS/Units/Exams/BchinotBagrut/HerkevTeuda/MeydaAlTeudatBagrut.htm Bing English translation

The Baccalaureate diploma is provided to every student that successfully completed the necessary requirements. It is jointly provided by the Division for Exams in the Pedagogical Secretary and by the school in which the student concluded his studies. The level of studies in the system is defined by the level of deepening of studies in the discipline, level of difficulty of the exam and the number of weekly study hours in the given discipline. The range in different disciplines is from 1 to 5 study units. In general there are 90 classroom hours required for each study unit so for a discipline at the level of 5 units there were 450 hours of study in the classroom. The grade for each discipline is a combination of the mean grade obtained by the student in the exams carried out internally at their school so as to determine their annual grade with the grade he obtains in the external official examination.

The disciplines to be included in the diploma :

http://cms.education.gov.il/EducationCMS/Units/Exams/BchinotBagrut/HerkevTeuda/MiktzootHalimudBateuda.htm Bing English translation

Alternative Evaluation

http://cms.education.gov.il/EducationCMS/Units/Mazkirut_Pedagogit/AgafPituachPedagogi/Iemida_mashmautit/HoraaLemidaHAaracha/chalufot.htm Bing English translation

The Division for Pedagogical Development in the Pedagogical Secretary of the Ministry of Education developed a document for school directors and teachers in which three alternatives research based ways for Teaching-Learning-Evaluating are presented. These genres are adequate for most disciplines and may be considered as alternative evaluation methods for the optative and widening elements in the curriculum (30%). The three main genres are for Teaching-Learning-Evaluating are:

- Learning through a research project whose final product is a written report (Research work)
- Problem-based learning
- Portfolio

The document presents existing frameworks that may enable the extension of such genres also to the Baccalaureate (Matriculation) exams in addition to the optional elements of the curriculum:

- Research based learning that substitutes the examination in an compulsory discipline – 2 Units (Research Pilot)
- Conclusion work (like a thesis) for the entire 5 units
- Research based learning for different extent in the framework of a specially designed program of studies.

See: The main alternatives for teaching, learning and evaluating. Ministry of Education, Pedagogical Secretary, Pedagogical Development Division, May 2014 (Hebrew)

http://cms.education.gov.il/NR/rdonlyres/9A52B8F0-C117-4515-B9A5-BCDF8A4EE3F2/196636/HalufotHaaracha1.pdf

7a) Is there any recent evidence concerning the implementation or evaluation of STEM curriculum or assessment reform which has taken place since 2005 in your country?

Yes

7b) Please provide details as well as any references to relevant reports/URLs/evaluation studies etc. (remembering to indicate if they are only available in your national language or in English).

It was included in the reply for sections 6b above

D NATIONAL STEM INITIAL AND IN-SERVICE TEACHER EDUCATION:

8a) Have there been any recent, ongoing or planned initiatives since 2012 specifically targeting initial teacher education in STEM at primary and/or secondary level in your country?

Yes

8b) Please provide details (mentioning the specific topic/s on which the training was provided) as well as any references to relevant reports/URLs/evaluation studies etc. (remembering to indicate if they are only available in your national language or in English).

The institution with overall responsibility for teachers' training at the national level is the Division for Teachers' Training at the Administration for Teaching Personnel in the Ministry of Education.

See here. Bing English translation.

The Academic Education Colleges run routine programs for training teachers for primary and secondary education for Mathematics, Sciences and Technology. From time to time there are special programs according to the needs of the educational system.

Three special programs for training engineers as teachers in secondary education were run in 2012: electricity/electronics; machines; and computer science. A similar program is being run now, in 2015.

In 2013 a special program was run for training holders of university degrees in one of the Sciences as teachers of Science and Technology in the junior high school.

There are several programs in cooperation with the Trump Foundation to train teachers of Mathematics in an special residency program where the training takes place mainly in the schools; such program provides an opportunity for the students an enlarged experience in teaching while being trained (more details below).

Additional information:

There is an ongoing system wide reform in the initial training of teachers with deep implications for teacher education in STEM. The leitmotiv is that the quality of the teachers is a cardinal factor for the success of their students in the education system as expressed in capacity for complex, higher thinking; capacity to learn and structure knowledge in diverse fields; and the acquisition of values that will enable them to function at their best in the society in which they live.

Several policies and initiatives are being carried out to improve significantly the quality of those that choose teaching as their profession and of those that complete their professional training in the relevant institutions. The universities and the teacher training colleges are the institutions in which such preparation takes place. They were traditionally regulated by two different bodies – the Council for Higher Education and the Division for Teacher Training at the Ministry of Education. Much effort is being applied in rising and making uniform the quality demands of both kinds of institutions and transferring the Teachers' Training Colleges so as they are regulated and budgeted by the Council of Higher Education and its main operational arm, the Committee for Planning and Budgeting.

1. **The Ariav road map outline**: the Ariav outline was approved by the Council of Higher Education and the Ministry of Education. It sets common obligatory criteria for teaching training studies for all teaching training

institutions and provided academic status for such studies. The outline defines a core of subject of studies that enables each institution to relate to it according to its point of view. The outline stresses the practical experience and the importance of integration of educational studies, the teaching and practical experience. Following the Ariav outline the program of studies were updated and a common professional infrastructure established with the purpose of bringing quality human resources to the profession. It has strengthened the disciplinary studies and their professionalization.

2. **Stricter requirements**: The Division for Teacher Training with the heads of the Teachers' Training Colleges decided since 2013 on the gradual increase in the grades required for acceptance of a candidate to teacher training programs of studies. In many cases these are higher than those required at the universities. Many Colleges make specific requirements in different specializations like the demanding successful examinations for 5 units in the Baccalaureate diploma in the area of specialization, fitness tests, group exams and individual interviews. The Division is seeking to introduce selection processes that will assess the adequacy of the candidate for teaching studies regarding his personality, attitude towards children, capacity to function in different teaching situations, team work and more. The Division expects that such process will increase the professional prestige of the profession.

3. **Attracting quality candidates**: Several programs have been put in place lately to attract quality candidate for teaching and rewarding them.

    - Program for training quality academic professions as teachers. Special selection tools were developed to select the candidates. The process was accompanied by research to check the selection tools and their effectiveness in selecting appropriate candidates. Program developed by the Ministry of Finance and the Ministry of Education.
    - Academic rewards basket. This is a program to stimulate the Teacher Training Colleges to develop programs of studies for those disciplines in high demand in the system (like STEM) and choose candidates that stand up to quality criteria. There is an effort to attract highly qualified students through a program of scholarships and conditional loans
    - Excellence in teaching. Program focussed on student candidates with very high qualifications with a combined grade of 630 points (while in the regular programs only 525points are required). This is an intensive training program of three years. The participants are exempt from paying the tuition and get a living allowance of 5,000 NLI a year. They assume a commitment to work as teachers at least for three years. A quarter of their program of studies is unique for this group and includes reading-rich courses; tutorials; development of innovation, entrepreneurship and leadership capabilities (in addition to the regular requirements). They agree to a program of commitment to social-community volunteering program during the time of their studies. This program is intended to attract well qualified human resources for teaching and improved conditions for their work placement so they persist in the educational system. Many of those completing this program continue their studies to higher degrees and for professional development to fill senior positions in the system. The Ministry is now considering enlarging the program to offer a direct track to post graduate studies for those studying in the Excellence program.
    - Additional social/community oriented tracks: (1) Village Tzeela (Quality youngsters for teaching) – an holistic program combining studies for the first academic degree and teacher qualification with educational/community work during the studies and afterwards. The program include an enrichment program for leadership development and personal empowerment. They are exempted from tuition and during their studies start teaching 8 hours a week. (2) Educational Pioneers (Halutz) – it mobilizes students (called Halutzim – pioneers) at the end of the second year for a five year period. The complete their first degree, continue to the second and even complete the principals preparation. They work in deprived areas of the country in what are called Pioneer Schools. Those are schools that accepted to enter a five year program absorbing the participants of the program. These schools receive support from the Institute for Democracy. (3) Meitav (HHTB – Senior youth movement members) that engages senior members of youth movements who have a deep commitment to education.

4. Academy/Classroom: a new program of the Ministry of Education with the purpose to advance the teacher training process and switch to "Pair teaching" in the classroom. In the upcoming school year (2015/2016) a pilot will start in which three days in the week a thousand teacher students (in the third year of teaching training program) will come to 250 classrooms in kindergartens and schools (12-16 weekly hours). They will join veteran teachers for teaching together in an joint challenging experience in the classroom. See:

   - Academy/Classroom program: http://academia-kita.macam.ac.il/ Bing English translation
   - "Academy/Classroom" a partnership for strengthening teaching – policy paper summarizing the conclusions of the thinking team. Ministry of Education, Administration for Teaching Personnel, December 2014 (Hebrew). Available here.
   - Program for training tutors and accompanying instructors for beginning teachers of Mathematics and Sciences. Department for Science Teaching, The Weizmann Institute of Science (2013). (Hebrew). Available here
   - Observation: Earlier experiments with twin teachers for Chemistry were been carried out a few years ago by pairing the discipline teacher with a volunteer student of Chemistry. Such volunteers were participants of the Perach program which provides scholarships for students who agree to tutor school students. This program was changed and now pairs of students in a program called Teva HaChimia (The Nature of Chemistry – that mentions the name of company supporting the program, TEVA) teach Chemistry together. The Nature of Chemistry program (Hebrew) Bing English translation

8c) Is there any recent evidence concerning the implementation or evaluation of STEM initial teacher education initiatives which have taken place since 2005 in your country?

Yes

8d) Please provide details as well as any references to relevant reports/URLs/evaluation studies etc. (remembering to indicate if they are only available in your national language or in English).

The results of an ongoing research project are expected to be published at the end of 2015. It was carried out in the last 3 years and it evaluated the initial training of teachers in special programs including the above mentioned program for training engineers as teachers and that for training holders of Sciences university degrees as teachers of Science and Technology. This research includes also a program from 2010 for training teachers of Mathematics and Sciences. The report to be available through the Division for Initial Teacher Training from the Ministry (Hebrew).

Dr. Edith Mani-Ikan and Dana Rosen (2013). Teaching Sciences in Israel: trends, challenges and levers for change. The Henrietta Szold Institute, National Institute for Research in Behavioural Sciences. (Hebrew). Available here.

Additional documents from the Szold Institute concerning STEM teaching in Israel (Hebrew). Available here. Bing English translation

Shimeoni, S ., Avidov-Unger, O.(Eds.) (2013). On the continuum: training, specialization and professional development of teachers – policy, theory and practice. Mofet Institute and Ministry of Education, Tel Aviv. (Hebrew)

9a) Have there been any recent, ongoing or planned initiatives since 2012 specifically targeting in-service teacher education (professional development) in STEM at primary and/or secondary level in your country?

Yes

9b) Please provide details (mentioning the specific topic/s on which the training was provided) as well as any references to relevant reports/URLs/evaluation studies etc. (remembering to indicate if they are only available in your national language or in English).

The comprehensive reforms of the educational system include deep changes concerning the professional development of teachers both at the primary (Ofek Hadash) and at the secondary level (Oz LeTmura). Ofek Hadash is the result of an agreement between the Ministry of Education and the Teachers' Syndicate covering mostly primary education (including Junior High schools) and Oz LeTmura is the result of a later agreement between the Ministry and the Organization of Teachers in the Secondary Schools (including some Junior High Schools too). These reforms are being introduced gradually; while Ofek Hadash is well advanced in its implementation, Oz LeTmura deployment is slower, requiring the agreement of at least 50% of the teachers in a given school for its implementation.

Professional Development in Oz LeTmura

It highlights the following issues: (1) Career long learning stressing professional specialization in teaching (2) School based professional development intended to establish an institutional culture of a learning organization. (3) Training in preparation to assuming a new role and while exercising it (4) Improvement in the quality of the processes of teaching, learning, and evaluation. The Division for Professional Development involved all other relevant units in the Ministry and the Organization of Teachers in establishing the principles for professional development of the teachers. The main pedagogical principles are the following:

- The professional development for teachers will be grounded on programs prepared by the professional units of the Ministry; these courses will serve as the outline for professional development. (A list and links to the relevant STEM courses is included below)
- Every graded course will include an operational applicative task requiring documentation on the reflexion and application of the relevant process of learning and teaching.
- The principal (school director) will dialogue and build with each teacher an appropriate professional development track adequate for him.
- The professional development track will include the following areas: the discipline, the didactic-pedagogical, the managerial-organizational and the personal empowerment.
- The professional development will be carried out by the academic institutions recognized by the Council of Higher Education, the Pisga centres, the institutions for professional development of the teachers' organizations, and in the schools.
- As a rule a teacher will receive an addition to his salary each year after completing a course/courses of 112 hours, carry out successfully the course tasks, and be present regularly in the course. The basic minimal course unit is 28 hours.

Additional information:

Oz LeTmura – statement by the director of the Division for Professional Development

http://cms.education.gov.il/EducationCMS/Units/PituachMiktzoie/oz/davaehamenaheloz.htm

Bing English translation

Oz LeTmura – the professional development policy and its implementation

http://cms.education.gov.il/EducationCMS/Units/PituachMiktzoie/oz/mediniut.htm

Bing English translation

Professional development courses templates for the Oz LeTmura professional development program (Hebrew)

Mathematics http://www.scientix-israel.net/files/oz/mathematics

Biology http://www.scientix-israel.net/files/oz/biology

Chemistry http://www.scientix-israel.net/files/oz/chemistry

Physics http://www.scientix-israel.net/files/oz/physics

Science and Technology in Society http://www.scientix-israel.net/files/oz/sciencetechsociety

Technology Disciplines http://www.scientix-israel.net/files/oz/technologydisciplines

Professional Development in Ofek Hadash

The outline for professional development of teachers is the ground for the improvement of the teaching resources and consolidation of teaching as a profession. This outline is intended to establish a sequence of planning and execution of professional development processes in all phases of the development of the professional career of the teachers. The teacher will plan and map his professional development through a dialogue with the school director from a perspective of several years and considering his own needs, the school needs and the policy of the Ministry. The following papers detail this process:

Outline for professional development in ranks 1 to 6 (Hebrew)

http://cms.education.gov.il/NR/rdonlyres/86688C0C-2692-4A0B-A12B-ED5ADA87C7FD/153683/MitveOfekChadash.pdf

Towards the re-organization of the professional development processes for teachers (Hebrew)

http://cms.education.gov.il/NR/rdonlyres/86688C0C-2692-4A0B-A12B-ED5ADA87C7FD/191220/TowardsPTM.pdf

The teacher as a learner and instructor – from an experience of learning to an experience of teaching (Hebrew)

http://cms.education.gov.il/NR/rdonlyres/86688C0C-2692-4A0B-A12B-ED5ADA87C7FD/191234/teacherLearnerAndTeacher.pdf

The pedagogical and organizational aspects in advanced professional formation – ranks 7-9

http://cms.education.gov.il/EducationCMS/Units/PituachMiktzoie/meyda/PitoachMikzoei7-9/mediniut7-9.htm (Hebrew)

Bing English translation

The purpose is to enable teachers a reflective learning process concerning learning-teaching processes and their implementation to improve peer teaching-learning, team and school organizational climate while developing their professional identity. The purpose of the program for advanced ranks is:

- Expose the teacher to updated contents as part of their professional-academic development as expert teachers, leaders in their areas of competence
- Enlarge the competencies and skills and deepen knowledge as factors that generate initiatives in the organization and inquire on social pedagogical arenas to improve and advance the teaching and learning processes at school.
- To enable the professional growth of teachers while establishing the basis for their advancement as tutors and teachers' teachers.
- To develop the professional identity of experience rich teachers as pedagogical leaders to advance learners and develop reflective communities of teachers and peers, creativity, able to take initiatives and investigate to achieve improvement and consolidation of a sense of capability and renewal in teaching.

The principle of the program include: (1) Flexibility in the learning conditions, range of tasks required, and functional adequating to the teacher needs (2) Development of a cooperative professional learning community (3) Integration of practice, theory and experience (4) Learning in context and considering the school culture as the arena for choosing the application/research/initiative/and their assimilation (5) Development of the learner capabilities (emotional, cognitive, behavioral) and establishing the conditions for a shared dialogue that bridges the personal aspect to the collective (6) Learning and tutoring guided by practical and applicative outputs.

The learning for each advanced (7-9) rank will take place during three years. Two years will be carried out in an academic institution and another year will be chosen from the possibilities detailed in the outline for ranks 1-6. The teacher will decide by himself where and when he will study on the condition that at the end of three years he has completed 210 hours of study. In addition to the personal program the rank advancement will depend also from the annual advancement quota established by the Ofek Hadash labor agreement.

General document detailing the policy for professional development in grades 7-9 (Hebrew)

http://cms.education.gov.il/NR/rdonlyres/A8053F6E-CA94-4FDC-B00A-6F0824922187/153695/79.pdf

Professional development courses templates for the Ofek Hadash professional development program (Hebrew)

Mathematics: http://www.scientix-israel.net/files/ofek/mathematics

Science and Technology: http://www.scientix-israel.net/files/ofek/scienceandtechnology

Computer Science: http://www.scientix-israel.net/files/ofek/887.pdf

21st Century Competencies (ICT – Information and Communication Technologies)

http://www.scientix-israel.net/files/ofek/21stC_competencies

Environment, Sustainability, Agriculture:
http://www.scientix-israel.net/files/ofek/environment

9c) Is there any recent evidence concerning the implementation or evaluation of STEM in-service teacher education (professional development) initiatives which have taken place since 2005 in your country?

Yes

9d) Please provide details as well as any references to relevant reports/URLs/evaluation studies etc. (remembering to indicate if they are only available in your national language or in English).

The head of the Department for Professional Development for Teachers, Ilana Rosenberg, informed that there is a comprehensive ongoing evaluation process for all professional development programs of the Ministry that is carried out by an external consultancy company. Complementary to it are the feedback and evaluation procedures that are routinely carried out in all the programs in the Professional Development Centres of the Ministry, PISGOT (described in previous sections of this survey). The results of these evaluations are not published.

The policy papers and tools employed in the evaluation of teachers are available in the division for evaluation of educational workers:

http://cms.education.gov.il/EducationCMS/Units/HaarachatOvdeyHoraa/ovdioraa/harachat_morim.htm
Bing English translation

10a) Have there been or are there any plans to introduce any online form of professional development specifically for teachers teaching STEM at primary and/or secondary level (e.g. Massive Open Online Courses - MOOCs organized at international/national level; dedicated Moodle platforms or webinars etc.)?

Yes

10b) Please provide details as well as any references to relevant reports/URLs/evaluation studies etc. (remembering to indicate if they are only available in your national language or in English).

There are two hubs that deploy online professional development programs for teachers:

a. The Division for Information Technologies at the Administration for ICT, Technology and Information Systems in the Ministry:
   Online courses for teachers:
   http://online.lms.education.gov.il/course/category.php?id=7
   MOOCs for Professional Development of Teachers
   The Division plans to offer MOOCS for professional development in the school year 2015/2016. The development of such MOOCs is presently (August 2015) being completed.
   Additional announcements in the page: http://online.lms.education.gov.il/course/category.php?id=67

b. Centre for Educational Technology (CET)
   The Centre operates the program "The Virtual Campus for Israel Teachers" whose purpose is the professional development of teachers through distance learning. See: http://teachers.vcampus.cet.ac.il/

Several online STEM related courses for professional development are offered for 2015/2016 on Mathematics, Sciences, Problem Based Learning, and Inquiry Based Learning. See: http://vcampus.teachers2015.cet.ac.il/

11) Please indicate in the box below whether at national level for prospective teachers (students training to become teachers) sufficient initial teacher training is currently provided or more is needed in the specific knowledge and competence areas identified for STEM teachers, by marking an 'x' in the appropriate column. Please mention which evidence you are basing this on (e.g. official documents, national research, your professional experience of working with teachers etc.) and any additional explanations under the 'Evidence base/comments' column.

Knowledge and competence area of STEM teachers	Sufficient initial teacher training provided	More initial teacher training needed	Evidence base/comments
Professional content knowledge (teacher's mastery of subject-matter knowledge and the ability to teach it in a way that makes it possible for their students to learn)	Yes		
Inquiry/problem-based teaching and learning methods, including the use of practical laboratory experiments	Yes		
Context-based science teaching emphasizing the philosophical, historical, cultural and societal aspects of science and technology, as well as connecting scientific understanding with students' everyday experiences.	Yes		

Knowledge and competence area of STEM teachers	Sufficient initial teacher training provided	More initial teacher training needed	Evidence base/comments
Knowledge and ability to participate in Responsible Research and Innovation (RRI) processes, as well as teach the principles and practices of this approach to their students and help them become actively engaged in all stages.		Yes	
Knowledge and ability to teach the 'Nature of Science' (i.e. the key principles and ideas behind scientific knowledge)		Yes	
Knowledge and ability to teach scientific modelling skills		Yes	
Knowledge and ability to teach argumentation skills (i.e. the ability to persuade others of the validity of a specific idea/theory using well-supported arguments) e.g. through facilitating small group discussions etc.		Yes	
Knowledge and ability to use ICT effectively to teach STEM (e.g. using simulations of experiments, video conferences for demonstrations etc.)		Yes	
Knowledge and ability to plan and facilitate individual and collaborative science project work (project-based learning)	Yes		

Knowledge and competence area of STEM teachers	Sufficient initial teacher training provided	More initial teacher training needed	Evidence base/comments
Knowledge and ability to teach a diverse range of pupils with different abilities and motivation to study STEM	Yes		
Knowledge and ability to analyze students' beliefs and attitudes towards STEM		Yes	
Knowledge and ability to use diagnostic tools for early detection of students' learning difficulties in STEM		Yes	
Knowledge and ability to critically analyze and eliminate gender stereotypes which may be portrayed in teaching materials, and be careful to avoid such stereotyping when interacting with students as well as ensuring students do not encourage them amongst themselves		Yes	
Knowledge and ability to teach STEM taking into account the different interests of boys and girls		Yes	
Knowledge and ability to effectively collaborate with external STEM professionals (e.g. to update their own professional content knowledge and skills, as well as to cooperate with them to directly contribute to classroom teaching or out-of-school visits to STEM places of work etc.)	Yes		

Knowledge and competence area of STEM teachers	Sufficient initial teacher training provided	More initial teacher training needed	Evidence base/comments
Knowledge and ability to identify, locate, adapt and develop relevant and motivating STEM related learning resources	Yes		
Other (please specify here)			

12) Please indicate in the box below whether at national level for in-service teachers sufficient professional development is currently provided or more is needed in the specific knowledge and competence areas identified for STEM teachers, by marking an 'x' in the appropriate column. Please mention which evidence you are basing this on (e.g. official documents, national research, your professional experience of working with teachers etc.) and any additional explanations under the 'Evidence base/comments' column.

Knowledge and competence area of STEM teachers	Sufficient professional development provided	More professional development needed	Evidence base/comments
Professional content knowledge (teacher's mastery of subject-matter knowledge and the ability to teach it in a way that makes it possible for their students to learn)	Yes		
Inquiry/problem-based teaching and learning methods, including the use of practical laboratory experiments		Yes	
Context-based science teaching emphasizing the philosophical, historical, cultural and societal aspects of science and technology, as well as connecting scientific understanding with students' everyday experiences.		Yes	

Knowledge and competence area of STEM teachers	Sufficient professional development provided	More professional development needed	Evidence base/comments
Knowledge and ability to participate in responsible Research and Innovation processes, as well as teach the principles of this approach to their students and help them become actively engaged in all stages of the processes.		Yes	
Knowledge and ability to teach the 'Nature of Science' (i.e. the key principles and ideas behind scientific knowledge)		Yes	
Knowledge and ability to teach scientific modelling skills		Yes	
Knowledge and ability to teach argumentation skills (i.e. the ability to persuade others of the validity of a specific idea/theory using well-supported arguments) e.g. through facilitating small group discussions etc.		Yes	
Knowledge and ability to use ICT effectively to teach STEM (e.g. using simulations of experiments, video conferences for demonstrations etc.)		Yes	
Planning and facilitating individual and collaborative project-based learning		Yes	
Knowledge and ability to teach a diverse range of pupils with different abilities and motivation to study STEM	Yes		

Knowledge and competence area of STEM teachers	Sufficient professional development provided	More professional development needed	Evidence base/comments
Knowledge and ability to analyze students' beliefs and attitudes towards STEM	Yes		
Knowledge and ability to use diagnostic tools for early detection of students' learning difficulties in STEM		Yes	
Knowledge and ability to critically analyze and eliminate gender stereotypes which may be portrayed in teaching materials, and be careful to avoid such stereotyping when interacting with students as well as ensuring students do not encourage them amongst themselves		Yes	
Knowledge and ability to teach STEM taking into account the different interests of boys and girls		Yes	
Knowledge and ability to effectively collaborate with external STEM professionals (e.g. to update their own professional content knowledge and skills, as well as to cooperate with them to directly contribute to classroom teaching or out-of-school visits to STEM places of work etc.)	Yes		
Knowledge and ability to identify, locate, adapt and develop relevant and motivating STEM related learning resources	Yes		
Other (please specify here)			

13a) Are there any current or planned initiatives for recruiting more STEM teachers at national level? Such initiatives might cover recruiting new prospective teachers to train to become STEM teachers, as well as other types of initiatives targeting existing non-teaching professionals or teachers from other subject areas.

Yes

13b) Please provide details as well as any references to relevant reports/URLs/evaluation studies etc. (remembering to indicate if they are only available in your national language or in English).

Additional programs are being planned to train engineers for teaching engineering related disciplines in the secondary education. A call/tender was issued lately for the universities to propose training programs for teachers of Mathematics able to instruct students in the 5 units Mathematics program for the baccalaureate examinations (intensive Mathematics training).

Program for training quality academicians for teaching

This program purpose is to cope with the shortage of teachers for the STEM disciplines and English, in particular at junior high schools and secondary education and its focus is the population of highly qualified academicians: engineers from specific areas seeking employment in teaching as a second career; Hi Tech personnel; native English speakers. This is a cooperative program involving the Ministry of Education, Ministry of Finances, the Employment Service, the Ministry of Economy and the Council for Higher Education. The training program includes all the elements required for teacher training but the organization of studies is adapted to shorten the time of training. It lasts two semesters with 4-5 days of study each week due to constraint that do not allow an extended time of training: the high cost of the program (in which the participants receive a subsistence payment or unemployment benefits through the time of their studies) and most students having already established families. Those completing successfully the program are employed through personal contracts entitling them to wage benefits through the three years to which they have a commitment to work in the educational system. There is an alternative to extend such period for another additional two years.

HOTAM – engaging excellent STEM graduates for teaching

The purpose of this program is to engage graduates who completed STEM courses of studies (also English and Civic Studies) with excellent grades and have a high level of social commitment for teaching. They are deployed at periphery towns and in cities quarters in which there is a need for educational and social strengthening. The program seeks to stimulate students with outstanding achievements to begin their professional career in teaching in roles demanding leadership capabilities in addition to a feeling of social mission. The programs is a partnership between the Ministry of Education, JDC Israel and the movement “HaKol Hinuch” (Everything Education). The participants go through a teachers’ training program in three trimesters. The first in month July and August is carried out in a Boarding School conditions. Those found fit at the end of this trimester are embedded for teaching in schools for 80% of full employment beginning in September with close guidance from the staff of the program and teacher trainers in the school. Their formal training continues for another two trimesters including several concentrated study days. See:

Hotam: Program for mobilizing excellent graduates from the universities and colleges

Bing English translation

M.Teach in Teaching

This program train academicians towards a post graduate degree including the teaching license (M.Teach). It is intended for university graduates that concluded their studies with a grade of at least 80 points. This is two year program focused in one of the disciplines taught in the educational system and prepare teachers for secondary schools.

Second career for IDF army officers

This program is for officers of the rank of Lieutenant Colonel and above who served in the defence forces and have an academic degree. After a selection process that assess whether they are adequate for teaching they enter a study program towards a Teaching License in a specialization that corresponds to their academic field. The participants receive a conditional loan to cover the tuition from the Ministry of Education; grants both from the Ministry of Economy and from Tzevet the organization of pensioners from the IDF. They assume a commitment to teach at least two years in the educational system in the regular conditions.

Program for retraining engineers as teachers in the secondary education in STEM disciplines:

This program of the Ministry of Education is implemented jointly by the Teacher Education College Seminar HaKibutzim and the Academic Technological College ORT Braude and takes place in Tel Aviv. It is intended for academic diploma holders in Mechanical Engineering, Electrical Engineering, Electronics Engineering. Such diplomas should be recognized by the Israel Council of Higher Education or by a recognized academic institution from abroad.

http://cms.education.gov.il/EducationCMS/Units/HachsharatOvdeyHoraa/MoadeyHeiter/MehandesimLeHoraa.htm Bing English translation

For this section see also:

Dr. Nathan Berber from the Mofet Institute: Summary of the article by Noach Greeenfeld and Batya Bar-Lev (2013). The Division for Teachers Training – Policy and Practice. http://portal.macam.ac.il/ArticlePage.aspx?id=7871 Bing English translation

13c) Are there any current or planned initiatives aimed at specifically recruiting more female STEM teachers? Such initiatives might cover recruiting new prospective teachers to train to become STEM teachers, as well as other types of initiatives targeting existing non-teaching professionals or teachers from other subject areas.

No

13d) Please provide details as well as any references to relevant reports/URLs/evaluation studies etc. (remembering to indicate if they are only available in your national language or in English).

There is no reference to gender (women) – there is a female majority of teachers with the exception of the program for re-training of engineers.

E NATIONAL STEM CAREER GUIDANCE INITIATIVES

14a) Have there been any recent, ongoing or planned initiatives since 2012 specifically targeting STEM career guidance in your country (e.g. initiatives aiming at improving teachers' and career advisers' knowledge of the work currently conducted by STEM professionals, or initiatives directly targeting students etc.)?

Yes

14b) Please provide details as well as any references to relevant reports/URLs/evaluation studies etc. (remembering to indicate if they are only available in your national language or in English).

Counseling in the Scientific Technological Reserve

The main effort concerning STEM career guidance is part of the Scientific Technological Reserve program. It includes the training and deployment of counselors/ coordinators with specific tasks. Such tasks include supporting the school administration in the process of identifying suitable candidates for participation in the program at the Junior High School. They are also charged with supporting through individual counseling and small groups work the participants. Such support involves both the challenges posed by the special study program and also the maintaining the motivation of the participants through the emotional stress that characterises such high achievement program.

Publicity campaign

Among initiatives directly targeting students and their parents we can indicate the Technological-Scientific in Secondary Schools publicity campaign led by the Administration for Science and Technology headed by Dr. Ofer Rimon. This campaign employed mass media advertising and promoted the its programs of studies and in particular the Scientific Technological Reserve program and the TOV – Technician and Baccalaureate Diploma. See:

http://cms.education.gov.il/educationcms/units/madatech/learntech.htm

See also the campaign targeting the Arab sector:

http://cms.education.gov.il/educationcms/units/madatech/chinuchmadaitech/llearntecharabic.htm

The campaign was carried out through the Internet using a variety of email distribution lists and social media channels. See:

http://cms.education.gov.il/EducationCMS/Units/MadaTech/ChinuchMadaiTech/Mavo.htm

Bing English translation

For the Scientific Technological Reserve see its description in the Scientix Database.

For the TOV – Technician and Baccalaureate Diploma see its description in the Scientix Database.

School based programs in preparation to the transfer from Junior High School to the Secondary

We weren't able to identify a national program in this area. It should be registered that many junior high schools carry out orientation events and programs targeted to the students and their parent in preparation for their transfer from the junior high school to the secondary. It may be noticed an stress on STEM disciplines as these are particularly suited to high achievers. An example of such kind of presentation is available here (Hebrew).

The Psychological Counseling Service of the Ministry of Education

See: http://cms.education.gov.il/EducationCMS/Units/shefi Bing English translation

Division for Educational Counseling

http://cms.education.gov.il/EducationCMS/Units/Shefi/gapim/yeutz/Odot.htm Bing English translation

The Division for Educational Counseling is responsible to the national policy in providing educational counseling services for the educational system andits institutions. The service is provided to the institutions, their staff, students from age 3-18 , the parents and the inspectors at the regional and national level.

Educational counselors are required to have a post graduate diploma (M.A.) in educational counseling and a Teaching License. Their activities in the school include: (1) Development of the school team (2) Development and implementation of programs for development, intervention and prevention (3) Counseling the student as individual (4) Serving as an adviser and counseling the school management and staff (5) Intervention in crisis and stress situations (6) Developing special expertise in different areas of counseling and education.

The Counseling Service and the reforms

When the initial proposals for the present ongoing reforms were proposed the Psychological Counseling Service issue a document detailing the potential contribution of the counselors to its deployment. They suggested their involvement in: (1) School empowerment and decentralizing the management (2) Supporting the extension of the weekly work load of teachers to 40 hours (3) Purposeful education steered by outputs (4) Care for the individual (5) Improvement of achievements and gaps reduction (6) Pedagogical continuum (7) Concern with the multicultural fabric of the Israel society. See here (Hebrew)

F NATIONAL STEM GENDER BALANCE INITIATIVES

15a) Have there been any recent, ongoing or planned initiatives since 2012 specifically targeting gender balance in the number of boys and girls studying specific STEM subjects and pursuing specific STEM careers?

Yes

15b) Please provide details as well as any references to relevant reports/URLs/evaluation studies etc. (remembering to indicate if they are only available in your national language or in English).

1. Advancing girls students in the educational system in the STEM disciplines – work program for 2016

The Ministry of Education, Pedagogical Secretary, Sciences Division, the Inspectorate for teaching Science and Technology and the Unit for Gender Equality in Education have since 2013 developed a program to advance equal opportunities in gender and to advance girls students in their studies of Science and Technology. The main objective is to establish an organizational climate that stimulates equal opportunities in Science and Technology learning. It seeks to encourage student girls to choose disciplines from the scientific area: Physics, Chemistry, Biology, and the Engineering Technological disciplines) in secondary education in view of further career development in the future.

The objectives of the program include:

(1) To raise the number of girl students who choose to learn 5 units of Physics for the baccalaureate examinations by 10% in three years: (a) raise the motivation of all the students and in particular of girl students for STEM studies (b) to strengthen the feeling of capacity of the girl students for STEM studies in the junior high school and the secondary (c) to increase the number of the girl students who register for the program Scientific Technological Reserve by at least 50% (d)to care for the perseveration of girl students in the Scientific Technological Reserve in the transition from junior high school to the secondary.

(2) Coordination and pooling of resources and programs of the governmental Ministries and other bodies that operate in the educational system for the advancement of girl students and boy students and gender equality in Science and Technology.

(3)Enlarge the influence reach on girl students at crucial decision points. The goal is to encourage and inspire them to choose a career in the STEM area: parents, counsellors, principals, teachers, inspectors, instructors, local authorities.

Work program for 2015/2016

(1) Professional development for 50% of the teachers of Science and Technology that participate in in-service training programs with an emphasis on equality of gender opportunities.

(2) Preservation and consolidation of the activities that took place between 2013 and 2015; deepening of the activities in the regions of Tel Aviv; enlarging the activities in the regions Haifa, South and North.
(3) Development of teaching devices and learning environments for teachers and students that strengthen the gender aspects in STEM studies.
(4) Enhancing cooperation with the IDF (army); the universities; the industry; and the Science Museums for advancing girls students.

(5) Assimilation of the tools for evaluating teachers of Science and Technology on the gender aspects by the School Directors through a pilot in a number of schools.

2. The Ministry of Science, Technology and Space (MOST) is promoting a national initiative for the advancement of women in Science and Technology

Israel is partner of the Helsinki group that seek to enhance the interest of women in Science. The group is an initiative of the Directorate for Research and Innovation of the European Union. Following the guidelines of the group the government decided on the establishment of a "National Council for Women in Science and Technology" that works in cooperation with the Ministry. Since May 2014 the Chief Scientist of the Ministry, Prof. Nurit Yirmiah was nominated as chair of the new council; she is the former chair of the Leifer Centre for Gender and Women studies at the Hebrew University. The Council operates through three committees – for Education, Academy and Industry and their purpose is to advise the Council on the advancement of women in Science and Technology. To advance the goal to maximise the participation of women in Science and Technology while improving their conditions the Council advances the following matters:

1. Coordination between the governmental, public and private actors to advance women in Science and Technology.
2. Raise the public awareness to the problems involved in the advancement of women in Science and Technology.
3. Initiatives and activities with the purpose to advance women in Science and Technology including support for projects to advance women in education, academy and industry.
4. Coordination of the activities in this area vis a vis the European Union.

National Council for Women in Science and Technology http://most.gov.il/PromotingWoman/Pages/WomenCommittee.aspx

Bing English translation

3. Women Scientists of the Future

The program "Women Scientists of the Future" is a multi annual initiative to encourage girls to choose scientific and technological disciplines in secondary education (High School). It seeks to expose the girls to the variety of Scientific-Technological professions available for them to choose. It stresses opportunities these professions offer in the army (in a program enabling to complete the university studies before the compulsory army service) and in the work market. The purpose of the program is to establish a substantial body of leading future scientists in engineering and exact sciences. The Ministry cooperates in this program with the initiative "Kdam Atidim" (Hebrew). There are presently 600 participants and among them a third come from the Arab sector.

See: Women Scientists of the Future

http://most.gov.il/ScienceAndCommunity/futurescientist/Pages/default.aspx

Bing English translation

4. Ministry of Education, Unit for Gender and Sex equality in education http://cms.education.gov.il/EducationCMS/Units/Shivion/Odot/ (Hebrew)

Bing English translation

This unit is very active and took the initiative for many programs related to issues of gender in the school: the school committed to the principles of gender equality; the kindergarten from the point of view of gender; honour; gender and the social sciences; women traffic; a critical lecture anchored on gender; program for deepening issues of gender in civic studies, grade 9th; competition for students research projects in the social sciences concerning gender issues; being secure – girls in school; gender, empowerment and equality between sexes in the Arab society in Israel; Role models: pioneer women leaders; women that made history; from leaded women to women leaders.

Oshra Lerer, head of the unit, presented in the last annual conference of the Science Teachers Training Centre (April 2014) a paper entitled: Gender, Science and Technology education and what lies between them. Her main argument was that the classroom and the school are one among many spaces in which takes place, explicitly and implicitly, a gender dialogue. Such dialogue deeply influences the vision of the future and the aspirations of each girl and each boy in the educational system. The lecture is intended to present the existing gender gaps between the students concerning the discipline of Science and Technology, to present targets for changing the situation and to provide tools for teachers intervention in the school and in the classroom to realize such targets.

5. Campaigns

Women Scientists Talk

Six video clips produced by the Bloomfield Museum and widely disseminated by the Ministry of Education

http://cms.education.gov.il/educationcms/units/madatech/hinucmadatech/meidapirsumim/madaniyot_medabrot.htm (Hebrew)

Breaking through Women Scientists in the Israeli Society

Poster widely distributed by the Ministry of Education to schoools all over the country

http://cms.education.gov.il/educationcms/units/madatech/hinucmadatech/hativot/sivyonhizdamnuyot/pioneering_scientists.htm

Bing English translation

Cracking the Glass Roof

Program developed by the non-profit institution Kol Israel Haverim (Alliance Israelite Universelle) to promote women in STEM professions. In the link provided below there are links to sites developed by girl students in a variety of schools that participate in the program. Such sites are the documentation of research projects focused on potential role models, women who excelled as Scientists and Engineers.

http://most.gov.il/PromotingWoman/Pages/BreakingTheGlass.aspx

Bing English translation

https://www.facebook.com/CrackingTheGlassCeiling?_rdr=p

G THE USE OF ICT IN STEM EDUCATION

16a) Are there specific guidelines given in your country's official statutory documents detailing how ICT should be used for the teaching and learning of STEM subjects?

Yes

16b) Please explain. If yes, please specify what the statutory documents state about how ICT should be used in the teaching and learning of STEM subjects (e.g. ICT should be used to teach students how to design charts and other diagrams in Mathematics; for the recording of experiments in Science subjects; for modeling and simulation purposes etc.) If no, is this because there are general guidelines about how to use ICT for teaching and learning throughout the curriculum and the use of ICT in STEM is supposed to be covered by these general guidelines?

There are statutory documents for the whole system and also specific for the Science and Technology discipline which is the main STEM education channel in the primary education, including the junior high school. In continuation we detail such relevant documents.

An important development concerns the implantation in 2014/2015 of the Educational Cloud. This is a one point of service in which all ICT resources for the educational system can be accessed including the Educational Resources Library; software support; educational communities and fora; Learning Management Systems (LMS); MOOCs and more. A fundamental aspect that the Educational Cloud program covers is the **provision of support around the clock for all its users**. Such support is provided by telephone, mail, chat and forums.

A related development is the transfer of the Division for ICT and Information Technologies from the Administration for Science and Technology to the Administration for ICT, Technology and Information technology which operates also the Educational Cloud. The Division thus became an horizontal service supporting the whole educational system and not a niche dealing only with ICT disciplines in parallel to the other Technology related inspectors of the Administration for Science and Technology. The services provided by the Division are detailed in continuation below.

Guide for the ICT enabled school

The purpose of this document is to support the director, the teacher, the instructor and the inspector. It details the whole set of theoretical and procedural aspects, the projects and initiative in the ICT enabled school. The guide includes information and applicative details of the required outputs. It details also supporting national initiatives and services that schools are required to choose in different organizational framework. This guide will be updated periodically according to new developments.

http://sites.education.gov.il/cloud/home/tikshuv/Pages/hamadrich_Ibit_sefer_mtukshav.aspx

Bing English translation

Guidelines for office holders in the ICT program

Guidelines are provided for Instructor of School Clusters and for the ICT Coordinator in the School.

http://sites.education.gov.il/cloud/home/tikshuv/Pages/hanhaiot_le_baaley_tafkidim_ve_rakazim.aspx
Bing English translation

Criteria for Schools to Join the National ICT Program

In the school year 2014/2015 1,600 schools took part in the National ICT Program for Schools. Among these schools there were 1,500 which participated in the basic program and another 100 in the advanced program according to the budget that was available and the priorities set by the Ministry.

http://sites.education.gov.il/cloud/home/tikshuv/Pages/Tikshuv-criterion_Lebchirat_BetSefer.aspx

Bing English translation

The Division for and Information Technologies at the Administration for ICT, Technology and Information Systems of the Ministry of Education

The Division is charged with implementing the acquisition of ICT skills through the educational system in Israel. Its staff deals with implementation and guidance through a variety of means including fixed activities in schools, conferences, courses and lectures, guidance days, a variety of projects in different areas. See: http://sites.education.gov.il/cloud/home/tikshuv/Pages/peiluiot_metucshavot.aspx

Bing English translation

Main activities:

- Conferences, meetings and lectures
- Initiatives and projects
- Implementation of the national ICT program in the different regions
- The Digital Textbooks Program
- The program for implementing the BYOD (Bring your own device) approach
- Implementing cooperative learning
- Secure Interne program: advance secure surfing in the Web
- Academy in the network: synchronous online lectures by outstanding experts
- MOOCs (Massive Open Online Courses) in the educational system
- Support for the development of School Portals
- Distance learning in emergency times
- Partnerships

The Educational Cloud

http://sites.education.gov.il/cloud/home/Pages/default.aspx Bing English translation

This is a one point access to all educational ICT services targeting all stakeholders of the educational system: schools, officers, student, parents, non-profit institutions, foundations and corporations. The services include:

(1) The ICT program (2) Digital Content (3) Secure surfing of the Web (4) Digital eBooks

(5) Distance learning (6) Professional development (7) Cooperative learning

(8) Learning Management System (LMS) (9) The School Portal (10) School management

Digital content include access to a wide variety of resources including learning objects, eBooks, Video on Demand, learning environments and more. The STEM disciplines are well represented in the different content databases.

ICT in teaching Science and Technology

See (Hebrew):
http://cms.education.gov.il/NR/rdonlyres/15100211-B67B-4465-AC2D-486EF4625635/156420/20912.doc

An instance that provides a good example on the integration of ICT in STEM education are the guidelines issued by Shoshy Cohen the inspector for Science and Technology (taught in the primary education, including junior high schools). She details that the program for integrating ICT in teaching the discipline includes: (1) Integrating digital resources contents for teaching, learning and evaluation. (2) Integrating such resources for enrichment, establishing interest and challenges and increasing the motivation (3) Strengthening ICT skills is required for establishing ICT literacy capacity (4) Establishing communication processes through ICT, using the network for communication between the schools and the home; for cooperative learning; professional development; and safe Internet. The teachers are also instructed to use ICT in the teaching cycle.

The different phases for integrating ICT include:

(0)Learning activity based on a digital element (Film/presentation/other) that is integrate in one **specific part** of the lesson (for teaching, enrich, raise interest, challenge) (1) Planning a **lesson/teaching unit** that includes ICT according to the needs and character of the discipline (2) ICT is an integral component of the working environment of the teachers (the teacher lives and control ICT and use it for all relevant teaching needs) (3) ICT is integrated in the routine of teaching and learning (by teachers and students). The integration is at high level in terms of quality and professionalism while stressing direct teaching so as to ensure the appropriate ICT skills required at each cohort of students.

16c) Is ICT commonly used in primary and secondary STEM education in your country, and is it considered to bring added value to learning?

Yes

16d) Please specify the evidence base you used to answer the above question, and provide details as well as any references to relevant reports/URLs/evaluation studies etc. (remembering to indicate if they are only available in your national language or in English).

Evaluation of the national ICT program (2010-2015)

Dr. Noga Magen- Nagar (email: nogamagen at gmail.com) has carried out an evaluation of the national program “Adapting the Educational System to the 21st Century”. The reports have not been published but more details can be obtained by contacting Dr. Magen-Nagar.

Survey by RAMA the National Authority for Measurement and Evaluation in Education

The Ministry of Education activities schedule indicates that RAMA carried out in 2013 (April/May) a survey concerning the evaluation of the National ICT program for education. The sample covered 1,000 classrooms (grades 4th to 6th) in 500 schools and 100 observations at schools. It interviewed 500 school directors (principals) and 4,000 teachers at primary schools.

The RAMA site is at: http//:cms.education.gov.il/EducationCMS/UNITS/Rama and it can be contacted at rama@education.gov.il . See also Bing English translation.

H NATIONAL INITIATIVES TARGETING THE INTEGRATION OF RESPONSIBLE RESEARCH AND INNOVATION (RRI) PRINCIPLES AND PRACTICES IN STEM EDUCATION

17a) Is the concept of Responsible Research and Innovation (RRI) in the specific context of STEM education known/established in your country? Is the education community at national level familiar with the principles and practices of this approach and how it involves them?

Yes

17b) Are there any recent, ongoing or planned initiatives targeting the promotion of Responsible Research and Innovation (RRI) principles and practices in STEM education? (e.g. these might include initiatives focused on including RRI as a transversal element in STEM curricula and resources, or initiatives aimed at providing professional development for teachers on how they and their students can be actively involved in all steps of the Research & Innovation process, from decision making and design to implementation, evaluation and communication of research projects).

Yes

17c) Please provide details, and mention what specific area/s of Responsible Research and Innovation the initiative tackles within the context of STEM education (e.g. issues related to ethics, open access, inclusion and diversity etc.). Remember to mention any references to relevant reports/URLs/ evaluation studies etc. (remembering to indicate if they are only available in your national language or in English).

Israel universities participating in European projects are promoting Responsible Research and Innovation principles and practices. See for example:

University of Haifa: http://www.asset-scienceinsociety.eu/about/partners

Tel Aviv University: here

RRI in K12 Education

The main project in the K12 educational system promoting Responsible Research and Innovation is ASAM already registered in the Scientix database. The Ministry of Education announced its merger with the GLOBE project (see here – Hebrew) This project collaborates with the MAARAG initiative of the Israel Academy of

Sciences. MAARAG (Hebrew acronym for studying Ecological Systems as a network) is a consortium of organizations responsible for managing open spaces. Its objective is to support open space management with emphasis on biodiversity management and nature conservation in Israel. Since its establishment in 2007 the MAARAG has established monitoring and research activities at permanent sites (LTER) throughout Israel. It also provides a national monitoring program for regular and continuous tracking of ecological changes in open spaces. The Arava RTD Center of the Ministry of Science, Technology and Space is a main partner in the Maarag. It leads the establishment of a network of schools that are integral functional partners in the process of nature monitoring in Israel carried out by the MAARAG. This network adopted and disseminates Responsible Research and Innovation principles.

See: http://www.hamaarag.org.il/en/content/inner/about-hamaarag (English)

I ADDITIONAL INITIATIVES AND INFORMATION

18a) Please use the box below (and create as many further boxes as needed) to provide information about any current or planned STEM education initiative which you have not already mentioned in answer to the previous questions. These might be on topics not specifically addressed by the above questions, including for example, initiatives involving school partnerships with science-related organizations/industry, initiatives targeting STEM education for gifted and talented students or students with special needs etc.

Other STEM initiatives	
Name/title of initiative	HEMDA Schwartz-Reisman Science Education Center
Short description	HEMDA is the science campus for Tel Aviv-Yafo's secondary schools. It boasts a superior teaching staff (most of our teachers have a Ph.D. in chemistry or physics) and an extremely advanced work environment allowing each student to conduct individual experiments. Team work facilitates individualized initiatives contributing to students, science teachers, the Tel Aviv area and students who do not regularly attend HEMDA. Extra added value is expressed in making the science curriculum deeper and broader: theories are accompanied by student experiments, computerized audio-visual presentations, references from our library and the Internet. Outstanding project include: HETZ – The Junior Scientist Program, which exposes physics high-achievers to advanced physics beginning in the junior high school. MoaH – The Computational Science Program – is a special 5-unit program linking physics to the computer as a scientific tool.

Other STEM initiatives	
Rationale (reasons for introducing this measure)	This campus aggregates the best teaching resources and environment for STEM education. It copes with the problem that for the relatively limited number of students, small groups in each school, who choose physics and chemistry in Tel Aviv area there is no way to provide the best teachers and equipment in each school.
Type (e.g. national strategy, pilot programme, policy reform, promotion campaign, etc.)	Ongoing, routine, regular program in Tel Aviv region serving as a model for other regions.
Category (please indicate with an 'x' which of the following key area(s) your initiative fits under:	
STEM teaching & learning methods	x
STEM curricula	x
STEM teacher education (initial or in-service)	
STEM career guidance	
STEM gender balance	
Involvement of ICT in STEM	x
Other (please specify)	
Scope (e.g. national, regional, city or local level etc.). Include specific numbers where possible.	Regional
Initiator of initiative (e.g. Ministry of Education)	Initiative of the HaNadiv (Rotschild)Foundation in cooperation with Tel Aviv Municipality and the Weizmann Institute of Science
Partners involved in the initiative & their role (e.g. public-private partnership between schools and industry)	Rotschild Foundation, Tel Aviv Municipality, Weizmann Institute of Science
Target group(s) (please indicate with an 'x' which of the following are target groups of this initiative)	
Students	x
Teachers	x
Industrialists/Business managers	
Parents/Families	x

Other STEM initiatives	
Ethnic minorities	
Girls/women	
Boys/men	
The elderly	
Age-group of students (please indicate with an 'x' the age-group(s) of students concerned:	
Pre-primary (1-4 years)	
Lower primary pupils (5-8 years)	
Upper primary pupils (8-11 years)	
Lower secondary students (11-14 years)	
Upper secondary students (14-16 years)	x
Students aged 17 and above	x
University students	
STEM curricular subject(s): (please indicate with an 'x' the STEM subject(s) concerned)	
Physical sciences (e.g. Physics, Chemistry, Astronomy etc.)	x
Life Sciences (e.g. Biology, health studies etc.)	x
Computer Sciences (e.g. IT and Informatics)	x
Technology	
Engineering	
Mathematics	
Other (please specify)	
Time span (e.g. 2011-2013)	
Involvement of ICT within the initiative	ICT is well integrated in all aspects of this campus programs

Other STEM initiatives	
Evaluation results/reports (Please specify if any evaluation is planned or has been undertaken, and if so provide references/URLs to relevant material including the results e.g. evaluation reports, survey analyses etc., indicating in which language this information is available)	
Summary of main evaluation results	
Impact of the measure e.g. decision/intention to expand or generalize the action as a consequence of a successful pilot phase (please specify if any impact assessment is planned or has been undertaken, and if so provide references to relevant material e.g. statistics, and indicate if available in the original language only and/or in English)	
Additional information (e.g. website addresses, references to relevant documentation etc.)	HEMDA English site http://www.hemda.org.il/english/template/default.asp?maincat=2

Other STEM initiatives	
Name/title of initiative	Initiative for Applied Education Research of the Israel Academy of Sciences and Humanities
Short description	The Initiative for Applied Education Research provides Israeli decision-makers in the field of education with the most up-to-date scientific, critically-appraised knowledge so they can better formulate policy and design interventions that improve achievements in Israeli education.
Rationale (reasons for introducing this measure)	Research knowledge is an essential component in the planning of public policy or large-scale interventions. Critically-appraised research knowledge supports the formulation of policy that has a greater chance of success and is more apt to promote rational public discourse. The Initiative implements this vision in the field of education. Following consultations with senior Ministry of Education officials and other stakeholders, the Initiative's steering committee, appointed by the president of the Israel Academy of Sciences and Humanities, then oversees both the creation of a work plan and the peer-review process that precedes publication of produced reports.

Other STEM initiatives	
Type (e.g. national strategy, pilot programme, policy reform, promotion campaign, etc.)	National strategy
Category (please indicate with an 'x' which of the following key area(s) your initiative fits under:	
STEM teaching & learning methods	x
STEM curricula	x
STEM teacher education (initial or in-service)	x
STEM career guidance	
STEM gender balance	x
Involvement of ICT in STEM	
Other (please specify)	
Scope (e.g. national, regional, city or local level etc.). Include specific numbers where possible.	National
Initiator of initiative (e.g. Ministry of Education)	Israel Academy of Sciences and Humanities, the Rotschild (HaNadiv) Foundation
Partners involved in the initiative & their role (e.g. public-private partnership between schools and industry)	See previous question
Target group(s) (please indicate with an 'x' which of the following are target groups of this initiative)	
Students	
Teachers	X and mainly Decision Makers
Industrialists/Business managers	
Parents/Families	
Ethnic minorities	
Girls/women	
Boys/men	
The elderly	

Other STEM initiatives	
Age-group of students (please indicate with an 'x' the age-group(s) of students concerned:	
Pre-primary (1-4 years)	x
Lower primary pupils (5-8 years)	x
Upper primary pupils (8-11 years)	x
Lower secondary students (11-14 years)	x
Upper secondary students (14-16 years)	x
Students aged 17 and above	x
University students	x
STEM curricular subject(s): (please indicate with an 'x' the STEM subject(s) concerned)	
Physical sciences (e.g. Physics, Chemistry, Astronomy etc.)	x
Life Sciences (e.g. Biology, health studies etc.)	x
Computer Sciences (e.g. IT and Informatics)	x
Technology	x
Engineering	x
Mathematics	x
Other (please specify)	
Time span (e.g. 2011-2013)	Ongoing
Involvement of ICT within the initiative	Not significant
Evaluation results/reports (Please specify if any evaluation is planned or has been undertaken, and if so provide references/URLs to relevant material including the results e.g. evaluation reports, survey analyses etc., indicating in which language this information is available)	
Summary of main evaluation results	

Other STEM initiatives	
Impact of the measure e.g. decision/intention to expand or generalize the action as a consequence of a successful pilot phase (please specify if any impact assessment is planned or has been undertaken, and if so provide references to relevant material e.g. statistics, and indicate if available in the original language only and/or in English)	
Additional information (e.g. website addresses, references to relevant documentation etc.)	Web site: http://education.academy.ac.il/english/homepage.aspx (English) Publications (English): http://education.academy.ac.il/english/PublicationsList.aspx?FromHomepage=true Background materials: http://education.academy.ac.il/english/BackgroundMaterialsList.aspx?FromHomepage=true

Other STEM initiatives	
Name/title of initiative	Clinical Teacher Residency Training Program
Short description	A new type of a teacher training program, called Teacher Residency, which provides competitive tracks for outstanding university graduates. Teacher Residency programs are taught in schools, their content is based on practical experience, and is closely guided by expert teachers who tutor the students. These programs make extensive use of observation, video, and feedback. In the first year, trainee teachers will attend two day per week of studies in the schools, which will be comprised of lesson observation and analysis by expert teachers, teaching small groups of students and whole classes, pedagogical coaching by an accompanying teacher, team work with the school mathematics teaching staff, simulations, video recordings (with the help of the Weizmann Institute) and experimentation with project-based learning. In the second and third years of the program, once the participants are already teaching, they will undergo internship workshops and individual and group guidance.

Other STEM initiatives	
Rationale (reasons for introducing this measure)	There is a serious shortage of science and mathematics teachers in Israeli high schools, as a result of the imminent retirement of many teachers. Even in mathematics, an obligatory matriculation subject, many schools are still compelled to employ teachers who are not adequately qualified. Moreover, approximately 40% of the teaching students who apply to train as mathematics and science teachers do not ultimately join the teaching force, and of those who do become teachers, about half leave the profession during the first five years of teaching. These teachers say that the training they received was too theoretical, and did not prepare them for teaching in the classroom and school life; and that they did not receive adequate guidance or support as a new teacher.
Type (e.g. national strategy, pilot programme, policy reform, promotion campaign, etc.)	Project 2014-2018
Category (please indicate with an 'x' which of the following key area(s) your initiative fits under:	
STEM teaching & learning methods	x
STEM curricula	
STEM teacher education (initial or in-service)	x
STEM career guidance	
STEM gender balance	
Involvement of ICT in STEM	
Other (please specify)	
Scope (e.g. national, regional, city or local level etc.). Include specific numbers where possible.	
Initiator of initiative (e.g. Ministry of Education)	Trump Foundation
Partners involved in the initiative & their role (e.g. public-private partnership between schools and industry)	
Target group(s) (please indicate with an 'x' which of the following are target groups of this initiative)	
Students	

Other STEM initiatives	
Teachers	x
Industrialists/Business managers	
Parents/Families	
Ethnic minorities	
Girls/women	
Boys/men	
The elderly	
Age-group of students (please indicate with an 'x' the age-group(s) of students concerned:	
Pre-primary (1-4 years)	
Lower primary pupils (5-8 years)	
Upper primary pupils (8-11 years)	
Lower secondary students (11-14 years)	
Upper secondary students (14-16 years)	
Students aged 17 and above	
University students	X
STEM curricular subject(s): (please indicate with an 'x' the STEM subject(s) concerned)	
Physical sciences (e.g. Physics, Chemistry, Astronomy etc.)	
Life Sciences (e.g. Biology, health studies etc.)	
Computer Sciences (e.g. IT and Informatics)	
Technology	
Engineering	
Mathematics	X
Other (please specify)	
Time span (e.g. 2011-2013)	2014 – 2018

Other STEM initiatives	
Involvement of ICT within the initiative	Integrated
Evaluation results/reports (Please specify if any evaluation is planned or has been undertaken, and if so provide references/URLs to relevant material including the results e.g. evaluation reports, survey analyses etc., indicating in which language this information is available)	
Summary of main evaluation results	
Impact of the measure e.g. decision/intention to expand or generalize the action as a consequence of a successful pilot phase (please specify if any impact assessment is planned or has been undertaken, and if so provide references to relevant material e.g. statistics, and indicate if available in the original language only and/or in English)	
Additional information (e.g. website addresses, references to relevant documentation etc.)	http://www.trump.org.il/en/content/grant/school-based-clinical-teacher-residency-training-program-80-jewish-and-arab-high (English)

Other STEM initiatives	
Name/title of initiative	Views
Short description	The "Views" program, born out of the Technion (Israel Institute of Technology) commitment to promoting quality science, technology and engineering education in Israel, provides an opportunity for Technion alumni to earn an additional undergraduate degree as teachers of mathematics, science or technology. The Technion funds tuition of students in the program fully, without requiring a commitment by the students to work in the formal education system.
Rationale (reasons for introducing this measure)	There is a shortage of teachers for STEM disciplines in the secondary and the present workforce is ageing. This program engages veteran engineers and provides both an alternative second career for them and/or a process of skills acquisition and enrichment that may benefit them and their present employers in high technology insdustries.

Other STEM initiatives	
Type (e.g. national strategy, pilot programme, policy reform, promotion campaign, etc.)	Regular program
Category (please indicate with an 'x' which of the following key area(s) your initiative fits under:	
STEM teaching & learning methods	x
STEM curricula	
STEM teacher education (initial or in-service)	x
STEM career guidance	
STEM gender balance	
Involvement of ICT in STEM	
Other (please specify)	
Scope (e.g. national, regional, city or local level etc.). Include specific numbers where possible.	The program is carried out in the Technion, Israel Institute of Technology, located in the northern part of the country. It is however offered for interested parties all over the country.
Initiator of initiative (e.g. Ministry of Education)	
Partners involved in the initiative & their role (e.g. public-private partnership between schools and industry)	Technion Israel Institute of Technology, Ministry of Education
Target group(s) (please indicate with an 'x' which of the following are target groups of this initiative)	
Students	
Teachers	
Industrialists/Business managers	
Parents/Families	
Ethnic minorities	
Girls/women	x
Boys/men	x
The elderly	

Other STEM initiatives	
Age-group of students (please indicate with an 'x' the age-group(s) of students concerned:	
Pre-primary (1-4 years)	
Lower primary pupils (5-8 years)	
Upper primary pupils (8-11 years)	
Lower secondary students (11-14 years)	
Upper secondary students (14-16 years)	
Students aged 17 and above	
University students	X
STEM curricular subject(s): (please indicate with an 'x' the STEM subject(s) concerned)	
Physical sciences (e.g. Physics, Chemistry, Astronomy etc.)	X
Life Sciences (e.g. Biology, health studies etc.)	X
Computer Sciences (e.g. IT and Informatics)	X
Technology	X
Engineering	X
Mathematics	X
Other (please specify)	
Time span (e.g. 2011-2013)	Routine program
Involvement of ICT within the initiative	Integral part of the program including an active LMS
Evaluation results/reports (Please specify if any evaluation is planned or has been undertaken, and if so provide references/URLs to relevant material including the results e.g. evaluation reports, survey analyses etc., indicating in which language this information is available)	
Summary of main evaluation results	

Other STEM initiatives	
Impact of the measure e.g. decision/intention to expand or generalize the action as a consequence of a successful pilot phase (please specify if any impact assessment is planned or has been undertaken, and if so provide references to relevant material e.g. statistics, and indicate if available in the original language only and/or in English)	
Additional information (e.g. website addresses, references to relevant documentation etc.)	http://www.technion.ac.il/en/2015/07/new-faculty-for-science-education/ (English) http://edu.technion.ac.il/free_page.php?id=30 (Hebrew) see Bing English translation

Other STEM initiatives	
Name/title of initiative	Computer Science for Junior High School
Short description	As part of a national strategic plan recently established by the Ministry of Education in Israel to strengthen science and technology education, an innovative Computer Science (CS) curriculum for middle school was developed. One main goal of the new curriculum is to expose students at an early stage of education to the fundamentals of CS and computational thinking, and to encourage students to study CS in the future. We present the curriculum and its initial implementation, focusing on issues of teachers' professional development.
Rationale (reasons for introducing this measure)	to strengthen science and technology education
Type (e.g. national strategy, pilot programme, policy reform, promotion campaign, etc.)	National strategy
Category (please indicate with an 'x' which of the following key area(s) your initiative fits under:	
STEM teaching & learning methods	x
STEM curricula	x
STEM teacher education (initial or in-service)	x
STEM career guidance	
STEM gender balance	

Other STEM initiatives	
Involvement of ICT in STEM	x
Other (please specify)	
Scope (e.g. national, regional, city or local level etc.). Include specific numbers where possible.	National
Initiator of initiative (e.g. Ministry of Education)	Ministry of Education
Partners involved in the initiative & their role (e.g. public-private partnership between schools and industry)	Ministry of Education
Target group(s) (please indicate with an 'x' which of the following are target groups of this initiative)	
Students	x
Teachers	x
Industrialists/Business managers	
Parents/Families	
Ethnic minorities	
Girls/women	
Boys/men	
The elderly	
Age-group of students (please indicate with an 'x' the age-group(s) of students concerned:	
Pre-primary (1-4 years)	
Lower primary pupils (5-8 years)	
Upper primary pupils (8-11 years)	
Lower secondary students (11-14 years)	x
Upper secondary students (14-16 years)	
Students aged 17 and above	
University students	

Other STEM initiatives	
STEM curricular subject(s): (please indicate with an 'x' the STEM subject(s) concerned)	
Physical sciences (e.g. Physics, Chemistry, Astronomy etc.)	
Life Sciences (e.g. Biology, health studies etc.)	
Computer Sciences (e.g. IT and Informatics)	x
Technology	
Engineering	
Mathematics	
Other (please specify)	
Time span (e.g. 2011-2013)	
Involvement of ICT within the initiative	Integral part
Evaluation results/reports (Please specify if any evaluation is planned or has been undertaken, and if so provide references/URLs to relevant material including the results e.g. evaluation reports, survey analyses etc., indicating in which language this information is available)	
Summary of main evaluation results	
Impact of the measure e.g. decision/intention to expand or generalize the action as a consequence of a successful pilot phase (please specify if any impact assessment is planned or has been undertaken, and if so provide references to relevant material e.g. statistics, and indicate if available in the original language only and/or in English)	
Additional information (e.g. website addresses, references to relevant documentation etc.)	http://www.computer.org/csdl/proceedings/fie/2012/1353/00/06462365-abs.html Reuven Hotoveli, "Implementing a new Computer Science Curriculum for middle school in Israel", FIE, 2012, 2013 IEEE Frontiers in Education Conference (FIE), 2013 IEEE Frontiers in Education Conference (FIE) 2012, pp. 1-6, doi:10.1109/FIE.2012.6462365

Other STEM initiatives	
Name/title of initiative	Excellence 2000
Short description	This program has as its target excellent students in the educational system and it seeks to establish a culture of excellence at the school. It operates beginning from the 5th grade up to the Secondary in all educational sectors of Israel. Its focus is on diverse STEM disciplines including Experimental Sciences, Mathematical thinking, Technology and more.The program is carried out in partnership with leading research institutions and universities in Israel and abroad.
Rationale (reasons for introducing this measure)	To stimulate an organizational culture of excellence at schools.
Type (e.g. national strategy, pilot programme, policy reform, promotion campaign, etc.)	Intervention program by a non-profit organization
Category (please indicate with an 'x' which of the following key area(s) your initiative fits under:	
STEM teaching & learning methods	x
STEM curricula	x
STEM teacher education (initial or in-service)	x
STEM career guidance	
STEM gender balance	
Involvement of ICT in STEM	x
Other (please specify)	
Scope (e.g. national, regional, city or local level etc.). Include specific numbers where possible.	National
Initiator of initiative (e.g. Ministry of Education)	Israel Center for Excellence through Education
Partners involved in the initiative & their role (e.g. public-private partnership between schools and industry)	Partners: Israel Center for Excellence in Education, Skirball Foundation (program for primary schools), Mitchell Foundation (program for junior high schools), the Space Club with the Asher Institute for Space Research in the Technion, the Scientific Experience program in partnership with individual researchers and institutions and more.
Target group(s) (please indicate with an 'x' which of the following are target groups of this initiative)	

Other STEM initiatives	
Students	x
Teachers	x
Industrialists/Business managers	
Parents/Families	
Ethnic minorities	
Girls/women	
Boys/men	
The elderly	
Age-group of students (please indicate with an 'x' the age-group(s) of students concerned:	
Pre-primary (1-4 years)	
Lower primary pupils (5-8 years)	
Upper primary pupils (8-11 years)	
Lower secondary students (11-14 years)	x
Upper secondary students (14-16 years)	x
Students aged 17 and above	x
University students	
STEM curricular subject(s): (please indicate with an 'x' the STEM subject(s) concerned)	
Physical sciences (e.g. Physics, Chemistry, Astronomy etc.)	x
Life Sciences (e.g. Biology, health studies etc.)	x
Computer Sciences (e.g. IT and Informatics)	x
Technology	
Engineering	
Mathematics	x
Other (please specify)	

Other STEM initiatives	
Time span (e.g. 2011-2013)	Ongoing
Involvement of ICT within the initiative	Integral part
Evaluation results/reports (Please specify if any evaluation is planned or has been undertaken, and if so provide references/URLs to relevant material including the results e.g. evaluation reports, survey analyses etc., indicating in which language this information is available)	
Summary of main evaluation results	
Impact of the measure e.g. decision/intention to expand or generalize the action as a consequence of a successful pilot phase (please specify if any impact assessment is planned or has been undertaken, and if so provide references to relevant material e.g. statistics, and indicate if available in the original language only and/or in English)	
Additional information (e.g. website addresses, references to relevant documentation etc.)	http://www.excellence.org.il/Index.asp?CategoryID=211&ArticleID=94 Bing English translation

Other STEM initiatives	
Name/title of initiative	Kadima Mada (Advance Science)
Short description	The purposes of the Kadima Mada program are: to advance STEM studies in the formal and informal educational system; to integrate advanced technologies in teaching and learning; support for children in the schools operated in hospitals in Israel. Ongoing projects include: providing an adequate ICT environment for Project Based Learning (PBL); Interdisciplinary thinking in an Technology-rich environment; ICT based research projects in Biology (BioHeker); Development of Scientific Thinking; Hillel evaluation for learning (with the Trump Foundation); the next generation of Learning and Evaluating – solving problems online and collectively (with the Pearsons publishing house).
Rationale (reasons for introducing this measure)	The importance of STEM studies for Israel

Other STEM initiatives	
Type (e.g. national strategy, pilot programme, policy reform, promotion campaign, etc.)	Program of national scope initiated by the World Ort organization
Category (please indicate with an 'x' which of the following key area(s) your initiative fits under:	
STEM teaching & learning methods	x
STEM curricula	x
STEM teacher education (initial or in-service)	x
STEM career guidance	
STEM gender balance	
Involvement of ICT in STEM	x
Other (please specify)	
Scope (e.g. national, regional, city or local level etc.). Include specific numbers where possible.	National
Initiator of initiative (e.g. Ministry of Education)	World ORT Organization
Partners involved in the initiative & their role (e.g. public-private partnership between schools and industry)	Local councils and towns in the geographical periphery in Israel, in the north and south; governmental ministries; Cities; regional councils. About 30 schools are affiliated and they represent all the sectors of the Israel educational system.
Target group(s) (please indicate with an 'x' which of the following are target groups of this initiative)	
Students	x
Teachers	
Industrialists/Business managers	
Parents/Families	
Ethnic minorities	x
Girls/women	
Boys/men	
The elderly	

Other STEM initiatives	
Age-group of students (please indicate with an 'x' the age-group(s) of students concerned:	
Pre-primary (1-4 years)	
Lower primary pupils (5-8 years)	
Upper primary pupils (8-11 years)	
Lower secondary students (11-14 years)	x
Upper secondary students (14-16 years)	x
Students aged 17 and above	x
University students	
STEM curricular subject(s): (please indicate with an 'x' the STEM subject(s) concerned)	
Physical sciences (e.g. Physics, Chemistry, Astronomy etc.)	x
Life Sciences (e.g. Biology, health studies etc.)	x
Computer Sciences (e.g. IT and Informatics)	x
Technology	x
Engineering	x
Mathematics	x
Other (please specify)	
Time span (e.g. 2011-2013)	Since 2007 and ongoing
Involvement of ICT within the initiative	
Evaluation results/reports (Please specify if any evaluation is planned or has been undertaken, and if so provide references/URLs to relevant material including the results e.g. evaluation reports, survey analyses etc., indicating in which language this information is available)	
Summary of main evaluation results	

Other STEM initiatives	
Impact of the measure e.g. decision/intention to expand or generalize the action as a consequence of a successful pilot phase (please specify if any impact assessment is planned or has been undertaken, and if so provide references to relevant material e.g. statistics, and indicate if available in the original language only and/or in English)	
Additional information (e.g. website addresses, references to relevant documentation etc.)	http://www.kadimamada.org/index2.php?id=293&lang=HEB Bing English translation

Other STEM initiatives	
Name/title of initiative	ZIPORIM (BIRDS) – Inquiry-base learning project on migrating birds
Short description	The Inquiry Project on Migrating Birds, Ziporim, takes place in the framework of Science and Technology studies in grade 6 of primary and grades 8 & 9 of junior high school with the aim of advancing inquiry-based teaching and learning.
Rationale (reasons for introducing this measure)	Ziporim seeks to attain several goals: (1) Content – enrich understanding and knowledge in the field of Life Sciences; systems and processes in living creatures, ecological systems and diversity in nature. (2) Skills – enhance the application of skills for scientific research, computer and information-seeking literacy, collaborative learning, learning in diversified environments, learning outside the classroom. (3) Values – develop appreciation of natural phenomena, respect for and sense of belonging to the environment, uniqueness of man and his impact on the environment, developing responsibility and involvement in preserving the environment and educating towards sustainability.
Type (e.g. national strategy, pilot programme, policy reform, promotion campaign, etc.)	National strategy of Enquiry Based Learning
Category (please indicate with an 'x' which of the following key area(s) your initiative fits under:	
STEM teaching & learning methods	x
STEM curricula	x

Other STEM initiatives	
STEM teacher education (initial or in-service)	
STEM career guidance	
STEM gender balance	
Involvement of ICT in STEM	x
Other (please specify)	
Scope (e.g. national, regional, city or local level etc.). Include specific numbers where possible.	National
Initiator of initiative (e.g. Ministry of Education)	Initiative of the National Inspector for Science and Technology and director of the area of Sciences, Shoshy Cohen (Ministry of Education); Prof. Yossi Leshem from the Tel Aviv University and the Israel Birding Center of the Israel Nature Protection Society; and Roni Dayan head of the Division for Information Technologies of the Ministry of Education.
Partners involved in the initiative & their role (e.g. public-private partnership between schools and industry)	See prior question
Target group(s) (please indicate with an 'x' which of the following are target groups of this initiative)	
Students	x
Teachers	x
Industrialists/Business managers	
Parents/Families	
Ethnic minorities	
Girls/women	
Boys/men	
The elderly	
Age-group of students (please indicate with an 'x' the age-group(s) of students concerned:	
Pre-primary (1-4 years)	

Other STEM initiatives	
Lower primary pupils (5-8 years)	
Upper primary pupils (8-11 years)	x
Lower secondary students (11-14 years)	x
Upper secondary students (14-16 years)	
Students aged 17 and above	
University students	
STEM curricular subject(s): (please indicate with an 'x' the STEM subject(s) concerned)	
Physical sciences (e.g. Physics, Chemistry, Astronomy etc.)	x
Life Sciences (e.g. Biology, health studies etc.)	x
Computer Sciences (e.g. IT and Informatics)	x
Technology	x
Engineering	
Mathematics	x
Other (please specify)	
Time span (e.g. 2011-2013)	Ongoing program
Involvement of ICT within the initiative	Substantial
Evaluation results/reports (Please specify if any evaluation is planned or has been undertaken, and if so provide references/URLs to relevant material including the results e.g. evaluation reports, survey analyses etc., indicating in which language this information is available)	
Summary of main evaluation results	

Other STEM initiatives	
Impact of the measure e.g. decision/intention to expand or generalize the action as a consequence of a successful pilot phase (please specify if any impact assessment is planned or has been undertaken, and if so provide references to relevant material e.g. statistics, and indicate if available in the original language only and/or in English)	
Additional information (e.g. website addresses, references to relevant documentation etc.)	http://cms.education.gov.il/EducationCMS/Units/MadaTech/HinucMadaTech/Yesodi/HoraaCheker/Ziporim_Nodedot.htm Bing English translation

Other STEM initiatives	
Name/title of initiative	Globe
Short description	בנית גלוב The Globe program is an ICT based initiative for environmental education that follows weather and atmospheric phenomena in the world. Every year a conference takes place in which different environmental questions are discussed. In the last years the following issues were included: the carbon cycle in the near environment and phenology – research on the development of plants from its germination up to maturity.
Rationale (reasons for introducing this measure)	In Israel 97 primary and junior high schools take part in the program. These schools belong to diverse sectors of the Israel society and from different municipalities that have integrated the Globe program in the curriculum of Science or Geography integrated with the learning of the English language and the development of ICT skills. .
Type (e.g. national strategy, pilot programme, policy reform, promotion campaign, etc.)	Part of the national strategy for Enquiry Based Learning
Category (please indicate with an 'x' which of the following key area(s) your initiative fits under:	
STEM teaching & learning methods	x

Other STEM initiatives	
STEM curricula	x
STEM teacher education (initial or in-service)	
STEM career guidance	
STEM gender balance	
Involvement of ICT in STEM	x
Other (please specify)	
Scope (e.g. national, regional, city or local level etc.). Include specific numbers where possible.	National
Initiator of initiative (e.g. Ministry of Education)	Israel signed in 1995 the MOU of the Globe program through the initiative and sponsorship of the vice president of the United States, Al Gore. The partners to the program are the Ministry of Education; NASA; the University of Colorado in coordination with the US Embassy in Israel.
Partners involved in the initiative & their role (e.g. public-private partnership between schools and industry)	See previous question
Target group(s) (please indicate with an 'x' which of the following are target groups of this initiative)	
Students	x
Teachers	X
Industrialists/Business managers	
Parents/Families	
Ethnic minorities	
Girls/women	
Boys/men	
The elderly	
Age-group of students (please indicate with an 'x' the age-group(s) of students concerned:	
Pre-primary (1-4 years)	

Other STEM initiatives	
Lower primary pupils (5-8 years)	
Upper primary pupils (8-11 years)	x
Lower secondary students (11-14 years)	X
Upper secondary students (14-16 years)	
Students aged 17 and above	
University students	
STEM curricular subject(s): (please indicate with an 'x' the STEM subject(s) concerned)	
Physical sciences (e.g. Physics, Chemistry, Astronomy etc.)	
Life Sciences (e.g. Biology, health studies etc.)	x
Computer Sciences (e.g. IT and Informatics)	x
Technology	
Engineering	
Mathematics	
Other (please specify)	
Time span (e.g. 2011-2013)	Ongoing since 1995
Involvement of ICT within the initiative	Substantial
Evaluation results/reports (Please specify if any evaluation is planned or has been undertaken, and if so provide references/URLs to relevant material including the results e.g. evaluation reports, survey analyses etc., indicating in which language this information is available)	
Summary of main evaluation results	

Other STEM initiatives	
Impact of the measure e.g. decision/intention to expand or generalize the action as a consequence of a successful pilot phase (please specify if any impact assessment is planned or has been undertaken, and if so provide references to relevant material e.g. statistics, and indicate if available in the original language only and/or in English)	
Additional information (e.g. website addresses, references to relevant documentation etc.)	http://cms.education.gov.il/EducationCMS/Units/MadaTech/HinucMadaTech/Projects/HinucKayamut/proyektim.htm Bing English translation

18b) Additional information:
If necessary, please add any other comment or information to supplement or qualify any of your answers given above.

http://www.knesset.gov.il/mmm/data/pdf/m03089.pdf

Documents prepared by the Henrietta Szold Institute for the Behavioral Sciences (Hebrew)

Teaching Physics in Israel – an Evaluation report - available here

The teaching of Mathematics in Israel at the 5 learning units level – a survey of teachers – http://www.szold.org.il/_Uploads/dbsAttachedFiles/5(1).pdf

Teaching Sciences in Israel – trends, challenges and change levers http://www.szold.org.il/_Uploads/dbsAttachedFiles/skirahoraatmadim.pdf

International Sources on STEM Education in Israel (English)

OECD Reviews of Vocational Education and Training – skills beyond school review of Israel (2014) http://www.oecd.org/israel/ASkillsBeyondSchoolReviewOfIsrael.pdf

ETF – Israel trends, perspectives and challenges in strengthening vocational education for social inclusion and social cohesion (2014) available here

Bank Israel – Research Division (Hebrew)

Publication: Economic Developments in the Last Months, number 139, October 2014 up to March 2015, Bank Israel, Research Division, Jerusalem, June 2015 (from page 6)

http://www.boi.org.il/he/NewsAndPublications/RegularPublications/DocLib3/RecentEconomicDevelopments/develop139h.pdf

Current issue: the relationship between the quality of the education and growth – comparison of Israel and the world

This survey compares the quality of education in Israel to that of developed countries through diverse international indicators and it checks the relationship between these indicators and the long term growth of the economy. Diverse indicators of the quality of education in Israel – in particular investment per pupil, size of the class in primary school, achievements in international tests in sciences and mathematics - indicate that the situation of Israel is inferior in comparison to developed countries.

The research literature shows that such indicators explain the rate of long term growth of the economies. International tests like PISA shows that the quality of education in Israel lags behind that of the median OECD countries; this lag detract by 0.4 to 0.6 percentage points from the rate of long term growth and between a fifth to a quarter from the total long term productivity level.

http://www.knesset.gov.il/mmm/data/pdf/m03089.pdf

Documents prepared by the Henrietta Szold Institute for the Behavioral Sciences (Hebrew)

Teaching Physics in Israel – an Evaluation report - available here

The teaching of Mathematics in Israel at the 5 learning units level – a survey of teachers – http://www.szold.org.il/_Uploads/dbsAttachedFiles/5(1).pdf

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When the quality of the universities in Israel through international ranking comparisons they are the center of the distribution for advanced countries. However the rate of high school students whose baccalaureate entitles them to enter the universities education seems to be a brake to the continuing expansion of higher education. If this rate growths from 48% to 58% as a result of a real improvement of the quality of education then this may increase by 2% to 3% the long term GDP per capita.

Social Impact Bonds for promoting Excellence in Mathematics Education

See: Social Finance Israel http://www.socialfinance.org.il/ Details here

A social impact bond (SIB) is a tool used to finance social projects that relies on a pay-for-success mechanism. Funding for the project is raised from investors and returned by the government only if the pre-determined goals are reached, while the return to the investor is based on the value created for the government by dealing with the social problem.

The development of the SIB is led by Social Finance Israel (SFI) and includes an in-depth study and analysis of the social problem: a relatively small volume of 5-unit graduates in mathematics in recent years. SFI has reviewed data of an unprecedented magnitude provided by the Ministry of Education on 578,821 students graduating in 2007-2013, who took any level of matriculation exam in mathematics. The most significant and innovative part of the research conducted by SFI is the resolution of analysis achieved, down to the level of local authorities, cities and even individual schools. Thus, based on the data, SFI managed to note four potential groups for intervention. These groups were selected according to their potential for intervention, but also based on their suitability to a specific SIB. For example, SFI noted the institutions where there was the most significant decline in recent years and was also able to identify schools with a multitude of students excelling in 4-unit mathematics alongside a low number of 5-unit mathematics graduates –i.e. schools with a high unfulfilled potential for excellence.

Information about Israel in the eSkills for Jobs 2015 initiative of the Commission

See: Dr. Ofer Rimon http://eskills4jobs.ec.europa.eu/israel

The Forum for Science and Technology Education

The Forum for Science and Technology Education was established by the Neaman Institute for National Policy Research in 2013. Its purpose is to establish cooperation arrangements between different sectors of the Israeli society in view to advance Education in Science and Technology from the kindergarten up to the end of the secondary in the 12th grade. The Neaman Institue decided to focus on this area in view of the importance of STEM for the future of the State of Israel and the need to increase the number of secondary schools students who choose these area for specialization.

Head of the project: Prof . Orit Hazan

See: The Forum for Science and Technology Education (English)

Other Neaman Institute Education projects: http://www.neaman.org.il/Education

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Rocard et al. (2007) High Level Group on Science Education, Directorate General for Research, Science, Economy and Science, European Commission, Science Education Now: A Renewed Pedagogy for the Future of Europe: http://ec.europa.eu/research/science-society/document_library/pdf_06/report-rocard-on-science-education_en.pdf

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