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State of Israel
Ministry of Education

TORINO PROCESS

ANALYTICAL FRAMEWORK FOR REVIEWS OF VOCATIONAL EDUCATION AND TRAINING SYSTEMS AND POLICIES IN ISRAEL

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List of abbreviations

CBS	Central Bureau for Statistics
ETF	European Training Foundation
HR	Human Resources
IAESI	Israel Association of Electronics and Software Industries
IDF	Israel Defence Forces
ICT	Information and communication technologies
ITTS	Government Institute for Training in Technology and Science
MAI	Manufacturers' Association of Israel
MK	Member of Knesset
MoE	Ministry of Education
MoITL	Ministry of Industry, Trade and Labour
MoS	Ministry of Science
NCRCD	National Council for Research and Civilian Development
R&D	Research & Development
SDVT	Senior Division for Vocational Training

Executive summary

In 2012 Israel has made technological and vocational education a national priority and set respective objectives and targets.

CONTEXT

Population

At the end of 2011, Israel's population was estimated at approx. 7,836,000. Of them, 5,901,000 were Jews (75.4% of the population), 1,610,000 Arabs (20.6%) and 325,000 others (4.1%). There were 979 men in Israel for every 1000 women. Israel's population is considered relatively young; in 2010 the median age increased to 29.4 years.

Education expenditure

The most recent OECD data (for 2008) showed that Israel's overall expenditure on education is with 7.3% of GDP high, compared to the average 6.1% of OECD member countries. Education expenditure in this context includes that of government departments, local authorities, parents, funds and donations at all educational levels, from pre-primary to higher education.

However, a comparison of the average expenditure per pupil in fixed international prices (PPP) shows that Israel's average expenditure is lower than the OECD average at all educational levels. The gap is especially wide in post-primary and higher education - at USD 12,568 in Israel compared with USD 18,239 in the OECD, and in pre-primary education - at 3,953 in Israel compared with 6,254 in the OECD. In this comparison one needs to take into account the high percentage of young people in the Israeli population, while the percentage of the working age population who can finance education is relatively low.

TVET

In Israel the term 'technical and vocational education and training' (TVET) covers two different routes, one being technological-scientific education under the Science and Technology Administration of the MoE, and the other vocational education under the Senior Division for Vocational Training and Manpower Development of the MoITL. The MoE focuses on the development of theoretical knowledge, as well as capabilities, initiative and flexibility for future employment. The MoITL is in charge of updating the knowledge and ability of adults in accordance with technological developments in each discipline.

Taken together, students enrolled in either apprenticeships or the technological track accounted for 36.8% of all upper secondary students in 2010/2011.

Post-secondary education covers studies towards a non-academic diploma, focusing on practical, technical or vocational areas, and is intended to allow direct integration in the labour market. Post-secondary institutions award diplomas, such as for registered nurses, loss adjusters (insurance sector), practical engineers or technicians. Post-secondary education covers the 13^{th} and 14^{th} grades. It is divided into technological post-secondary education under the supervision of the Ministry of Education (MoE) and students at Technological Training Institutes, which are under the supervision of the Ministry of Industry, Trade and Labour (MoITL).

The MoE and MoITAL systems are two separate systems with no hierarchical relationships.

VISION, OBJECTIVES AND HOW THEY ARE REALISED

MoE's vision and objectives

The MoE's vision is to:

- Adapt technology education to the requirements of the 21st century for knowledge and skills in each discipline;
- Bring the number of professional staff in accordance with the needs of the economy and industry;
- Integrate current and future technologies, environmental protection and the use of green energies.

The specific objectives of the Science and Technology Administration of the MoE are to:

- Increase the number of students in technology-science education;
- Prepare infrastructures for further education for the training levels and degrees required in the business sector;
- Adapt technology-science education to international standards;
- Improve the knowledge and skills of all students in the science and technology fields;
- Encourage the adaptation of curricula in the technology-science tracks (including for technicians and practical engineers) to the needs of industry and the military, in terms of both employee numbers and quality;
- Provide a response to young people at risk by integrating them into technological-vocational education;
- Provide a response to the ultra-Orthodox population by integrating them into technological-vocational education, and
- Improve the image of technological education.

The MoE realises these objectives by:

Core programmes:

- Israel's scientific-technological reserve programme;
- Technician and matriculation program ('TOV' programme);
- Integrating ultra-Orthodox students in technological tracks and
- Special study routes, such as in ICT and qualified nursing, as well as

Longitudinal programmes:

- Regional technological centre;
- Integrating high-tech retired workers into the teaching of technology in schools;
- A large campaign has been conducted in the mass media;
- Every student and graduate of the technological educational system must carry out a final project that demonstrates interdisciplinary thinking, creativity, team work and self-discipline.

MoITL's vision and objectives

MoITL's Senior Division for Vocational Training and Manpower Development plans and initiates a variety of different training actions designed to meet the employment needs of various groups of the population**.** MoITL's vision is to:

- remove economic obstacles in the industrial marketplace caused by a shortage of skilled workers;
- remove obstacles that arise from a shortage of essential basic skills among professional workers;

- strengthen disadvantaged populations by preparing them for the needs of the labour market.

In addition, the MoITL
- regulates and sets professional standards in training;
- plans and organises supervision and pedagogical support for the system of training courses, qualifications and professional promotion.

The MoITL has drawn up a Five-Year Plan 2013–2017 that comprises the following objectives and targets:

Re. young people:
- doubling the number of pupils in vocational education (from 13,000 to 26,000);
- changing the split of subjects according to the needs of industry (alternative energy, water and environment, plastics, timber, metals, etc.);
- developing new curricula and updating existing ones in cooperation with employers;
- establishing a system of advanced workshops for gaining practical experience, and
- changing the image of vocational education.

Furthermore, the MoITL is currently active to update and change the scale of vocational qualifications in Israel in accordance with international agreements (including Europass, ECVET and EQF). The Ministry does so involving the consultative committee on apprenticeships, as well as representatives from the MoE, the technology networks, academia and industry.

As regards adults, MoITL's objectives are realised through:

- vocational training day courses (for certification studies);
- vocational training evening courses (mainly in business-related disciplines);
- industry training in the form of classes in the workplace;
- on-the-job training and
- training for technicians and practical engineers

View of the Manufacturers' Association

In recent years the Manufacturers' Association has been actively involved in a wide range of long-, medium- and short-term programmes and activities, from lobbying to promote and increase the number of students in Israel's technological-vocational education system, to sponsorship and involvement by manufacturing businesses in a range of programmes.

The Manufacturers' Association aims to offer attractive programmes to the younger generation so as to increase the number of students enrolled in special educational initiatives (Technicians and Matriculation programme); develop and validate curricula in accordance with industry's needs, and sponsor programmes for establishing advanced technology workshops and for the further training of teachers in industry.

EXTERNAL EFFICIENCY: ADDRESSING SOCIO-DEMOGRAPHIC, ECONOMIC AND LABOUR MARKET NEEDS

The great heterogeneity of the Israeli population is almost unique in today's Western world. Poverty in Israel is distributed unevenly across the population: the ultra-Orthodox and minority groups together make up around a quarter of the population, but represent more than half of the families living in poverty.

One of the main immediate underlying factors is the shortage of suitable employment (National Economic Council, 2007). In the long term, the main factors for ensuring economic growth and for reducing social inequalities are the development of human capital, education, knowledge, capabilities and skills, as well as mobility.

Evidence suggests a clear link between the level of education and the rate of participation in the labour market.

The highest rate of employment is in the business services sector (429,200 or 14.6%), followed by industry (416,700 or 14.2%).

Data concerning the employed population by occupation and years of education show that over 73% of all those employed in the business services sector have at least 13 years of education, while in industry this is true for over half of the workers. In the construction sector the majority of employed people have at the most 11–12 years of schooling.

As concerns the correlation between market needs and future professions, there are various committees and studies that deal with forecasting the development of the economy and industry. The needs of the economy and industry in the region close to the school are given weight in the composition of the curricula. Study tracks are introduced or discontinued according to a systemic view of Israel's entire economy.

The MoITL, in cooperation with the Manufacturers' Association, is conducting a process of mapping companies, industrial sectors and sought-after professions that can assist with decisions on the study tracks and subjects required in a particular town. The mapping has an effect on the level of investment and its targeting, in an attempt to strengthen employment in that town. For example, following local demand, a new curriculum focusing on railway professions will be implemented as a pilot in Dimona, and tourism professions are being strengthened in Tiberias.

INTERNAL EFFICIENCY AND QUALITY: CHALLENGES FOR THE EDUCATION AND TECHNOLOGICAL-VOCATIONAL TRAINING SYSTEMS

The MoE for its part is active to establish quality standards for science and technology within the schools under its supervision. A new project introduced this year is the digital textbooks pilot, which is currently run in elementary schools in the 7th and 8th grades, with an emphasis on science subjects. In addition, the MoE is examining innovative programmes for learning via projects, based on alternative assessment. During the 2011/2012 academic year 'Learning through Investigation' was implemented in 40 fields of knowledge, and this also led to a change in external examinations. One of the weaknesses that hinder the quality of technological education is its public image.

The challenge for the education and training systems is to increase significantly the number of students in technological-vocational education, and to raise the level of knowledge and skills of students and workers as a mechanism for enhancing productivity and economic growth.

MoE's main priorities

In this context, the MoE considers as its main priorities for the further improvement of technological-vocational education:

- standardising the knowledge and competences for each subject;
- standardising vocational qualifications;
- offering a solution for professional development and careers;
- developing laboratories and workshops at schools and regional centres;
- improving human resources in teaching;
- developing ICT-based, accessible learning materials;
- developing universal competences.

MoITL's main priorities include:

- establishing prestigious vocational schools in which a wide range of technological subjects will be studied at all levels;

- enhancing and upgrading existing MoITL schools (including in the military and in industry), and increasing their prestige, while strengthening and improving links with industry, with emphasis on in-plant apprenticeships;
- doubling the number of students in schools supervised by the MoITL;
- adapting the curricula to the needs of the economy, in cooperation with employers;
- establishing a system of advanced workshops;
- changing the image of vocational education in Israel;
- simplifying processes and bureaucratic procedures associated with obtaining approval for training courses.

Important priorities not manifested as part of current policy or actions include,

according to the MoE:

- The budgets earmarked for technological education are insufficient.
- There is an unsatisfying significant cooperation with industry, nor qualification processes

according to the MoITL:

- There are difficulties to train teachers in the vocational field. It is necessary to change the policy on the qualification of teachers and instructors in technological education.
- There is a lack of pedagogic tools for producing qualified expert instructors, with an updated methodological, pedagogical skills for teaching and instructing. An academic degree is not relevant here at all.
- There is a shortage of teachers in applied subjects.

However, to deal with these challenges and priorities, Haim Portnoy from the Central Bureau of Statistics remarked that:

"Embarking on such an undertaking requires multidisciplinary research, for which we don't have the tools at this stage. I assume this is the million dollar question (or much more than that), for which many players wish to receive an answer."

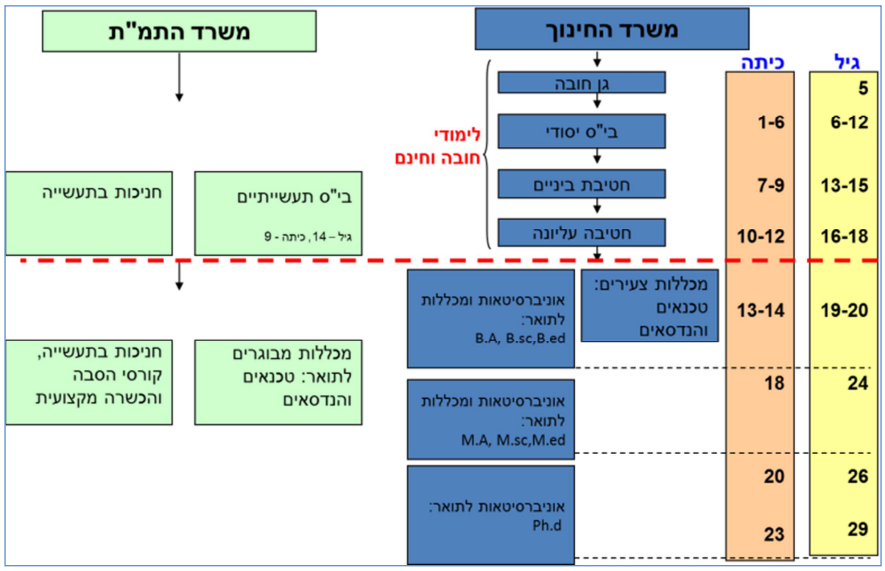
A. Vision for VET system development

This chapter addresses the vision of the government, companies and society at large to develop vocational technological education in the medium to long term, with reference to the economic, social and environmental strategy, to the challenges, to the available resources and to the implementation policy.

The Israeli education system is essentially heterogeneous in character, in terms of its structure, budgets and the multiplicity of educational institution types corresponding to the needs of various sectors. The Israeli education system can be divided into four main educational stages (or levels), by pupil age:

- **pre-primary education:** for children from age 3 until primary education age 6.
- **primary education:** includes six years of schooling (in a few institutions this stage covers eight years of schooling), ages 6–12;
- secondary education:
    - this stage covers a junior high and high schools; junior high school continues primary education and includes three years of schooling, 7th–9th Grades (ages13-15);
    - high school follows the junior high school, 10th-12th Grades (ages 16-18)
- post-secondary and higher education: ages 18 and above
    - post-secondary education covers studies towards a non-academic diploma, focusing on practical, technical or vocational areas, and is intended to allow direct integration in the labour market; post-secondary institutions award diplomas that include, for example, registered nurse, loss adjuster, practical engineer, technician; includes 13th and 14th Grades in technological post-secondary education under Ministry of Education (MoE) supervision, and students at Technological Training Institutes under Ministry of Industry, Trade and Labour (MoITL) `supervision
- **Higher education** covers academic studies for undergraduate, graduate and postgraduate degrees, recognised by the Higher Education Council; studies take place at universities, academic colleges and academic colleges of education.

Figure 1: The structure of the Israeli education system



In Israel the term 'TVET' (technical and vocational education and training) covers two different routes, one being technological-scientific education, and the other vocational education. The MoE is responsible for the technological- scientific studies track through the Science and Technology Administration, and the MoITAL maintains post-primary education systems that provide technical vocational training under its statutory powers (the 1953 Apprenticeship Act and the 1953 Youth Employment Act), and post-secondary systems at the Technological Training Institute. The overwhelming majority of post-primary pupils study in the education system supervised by the MoE.

Ministry of Education

(Information supplied by the, head of the Technology Branch, Science and Technology Administration, MoE, May 2012)

Following years of cuts to the technology-science education budget, the MoE, through the Science and Technology Administration, is now placing technological education as a top priority. Accordingly, the ministry has established a vision, and objectives for realising the vision.

The MoE's vision

Adapting the technology education system to the 21st century, in line with the requirements for knowledge and skills demanded in each discipline and the required number of professional staff in accordance with the needs of the economy and industry in all training, while integrating current and future technologies, environmental protection and the use of green energies.

Objectives of the Science and Technology Administration

- to bring about benefits and efficiency in the training of professional staff at all levels in accordance with the business sector's changing requirements and needs;
- to encourage adaptation of the curricula in the technology-science tracks (including for technicians and practical engineers) to the needs of industry and the military, both in terms of employee numbers and in terms of quality;
- to encourage specific populations (girls, Arabs, ultra-Orthodox) to work in industry;
- to prepare infrastructures for further education for the training levels and degrees required in the business sector;
- to adapt technology-science education to international standards.

- The objectives will be realised by:
- increasing the number of students in technology-science education;
- improving the knowledge and skills of all students in the science and technology fields;
- increasing the number of top students in the technology and science disciplines;
- increasing the number of those studying for technician and/ or practical engineer diplomas;
- providing a response to young people at risk by integrating them into technological-vocational education;
- providing a response to the ultra-Orthodox population by integrating them into technological-vocational education;
- improving the image of technological-vocational education.

Ministry of Industry, Trade and Labour[1]

This ministry deals with the development of the economy, human capital, technological capabilities and trade links; developing a physical and legal infrastructure in the fields of industry, trade and employment; and supervising and regulating industrial and trading activity in the labour market.

The MoITAL's vision for vocational education

The MoITAL's Senior Division for Vocational Training and Manpower Development initiates, plans and implements a variety of different training actions designed to meet the employment needs of various groups in the population. These groups include:

- boys and girls who have not found a suitable place in the state education system supervised by the MoE;
- soldiers in regular service, soldiers before demobilisation and demobilised soldiers;
- unskilled adults seeking work, or skilled ones wishing to retrain for a different profession;
- unemployed academics wishing to gain a profession that is in demand in the economy, or to update their profession;
- technicians and practical engineers;
- specific populations – new immigrants, Arabs, groups of women (ultra-Orthodox, those from development towns, female immigrants from Ethiopia), disadvantaged girls, people with disabilities, prisoners.

The objectives of the Senior Division for Vocational Training and Manpower Development

- removing economic obstacles in the industrial marketplace that are caused by a shortage of skilled workers;
- removing obstacles that arise from a shortage of basic skills among professional workers;
- strengthening disadvantaged populations by preparing them for the needs of the labour market;
- regulation and setting professional standards in training;
- planning, organisation, pedagogic support and supervision for the system of training courses, qualifications and professional promotion.

A working programme, the Five-Year Plan, has been drawn up in order to support the objectives. The programme has been approved by the Minister for Trade, Industry and

[1] Information from MoITAL presentation, November 2011

Labour and by the ministry's Director General, and is undergoing assessment by the Treasury.

The MoITAL's Five-Year Plan 2013–2017 – main principles

- doubling the number of pupils in vocational education (from 13 000 to 26 000);
- changing the split of subjects according to the needs of industry (alternative energy, water and environment, plastics, timber, metals etc);
- developing new curricula and updating the existing ones in cooperation with employers;
- establishing a system of advanced workshops for gaining practical experience (including central workshops in cooperation with the technology colleges);
- changing the image of vocational education.

In addition, the MoITAL is currently acting to update and change the scale of vocational qualifications in Israel in accordance with international accords (Europass, ECVET, EQF), through the consultative committee on apprenticeships, with the involvement of representatives from the MoE, the technology networks, academia and industry.

Manufacturers' Association of Israel

(Information supplied by the Head of Department for Technological Education and Vocational Training, May 2012)

The Manufacturers' Association is the representative and sole organisation of all industrial sectors in Israel. By representing the country's largest employers' organisation, it contributes to macro-economic decisions and leads the economy's system of organised labour relations

Manufacturers' Association's vision

Graduates of technological education – from those from secondary schools in the technological-vocational tracks, through technicians and practical engineers, to graduates of engineering schools in academia and colleges – are the people who move Israel's industry along over the years. These graduates make possible the development, production, maintenance and export of defence and civilian industries in high-tech fields such as electronics, mechatronics and computers, and also in mixed and traditional industrial fields such as plastics, metals, textiles and food. For this reason, the Manufacturers' Association and Israeli industry see as part of their role the motivation of processes, being proactive and being an active participant in the education system. According to their overall concept, investing in scientific-technological-vocational education is of critical importance in maintaining the competitiveness of Israeli industry and in Israel's socio - economic strength.

In recent years the Manufacturers' Association has been actively involved in a wide range of long-, medium- and short-term programmes and activities, from lobbying to promote and increase the number of students in Israel's technological-vocational education system, to sponsorship and involvement by manufacturers in a range of programmes: familiarising the younger generation with industry (through the educational branch of the Manufacturers' Association, Ta'asiyeda, [Industrial Knowhow]), attractive programmes for increasing the number of students in special educational initiatives (e.g. the TVB (Technicians and Matriculation programme), developing and validating curricula in accordance with industry's needs, and sponsoring programmes for establishing advanced technology workshops and for further training of teachers in industry.

In summary, there is overall agreement that a shortage of high-quality technological-vocational labour at all levels may significantly harm Israel's competitiveness. It is clear that government departments, according to their vision, give technological-vocational education high national priority and are joining together with the leading players in the field of technological-vocational education in seeking to increase significantly the number of students, with the aim of meeting the needs of the economy and industry and supporting disadvantaged populations.

In order to meet the aims and objectives, government departments act in cooperation with the Manufacturers' Association and the large technological education networks ORT, AMAL and AMIT, by sponsoring and running attractive programmes that encourage employment and educational mobility for young people and adults.

B. External efficiency: addressing demographic, economic and labour market needs

This chapter presents information about the socio-demographic characteristics and the main social trends in Israel, the economic sectors that contribute the most to gross domestic product (GDP) and employment, educational levels, state investment in education, the main market trends and the employment challenges facing the country in the wider context.

Survey – Israel: from the Central Bureau of Statistics' data

Israel is located at the south-western corner of Asia, east of the Mediterranean. Its area is 22 072 km^2 (excluding Gaza and the region of Judea and Samaria). Population density is 334.5 per km^2. On 31 December 2011 Israel's population was estimated at approximately 7 836 000[2]: 5 901 000 are Jews (75.4% of the population), 1 610 000 are Arabs (20.6%) and 325 000 are others[3] (4.1%). During 2011 Israel's population grew by around 141 000, a percentage growth of 1.8%, which is similar to growth over the past decade. There are 979 men in Israel for every 1 000 women.

- Israel's population is considered relatively young compared with those of other Western countries. In 2010 the percentage of children aged 0–14 in Israel was 26.5%, compared with an average of 17% in other Western countries, and the percentage of those aged 65 and over was close to 13% compared with 15%, respectively.
- The population's ageing trend is continuing. In 2010 the median age increased to 29.4 years. The median age of men in 2010 was 28.3 years and of women 30.5 years.
- The most up-to-date OECD data (for 2008) show that Israel's expenditure on educational institutions is relatively high: 7.3% of GDP compared with 6.1% in OECD member countries overall. Expenditure on education includes that of government departments, local authorities, parents, funds and donations at all educational levels, from pre-primary to higher education.
- In this comparison one needs to take into account that the percentage of young people in the Israeli population is relatively high compared with other OECD countries. Hence, on the one hand its percentage of pupils is relatively high and on the other, the percentage of the population of working age who can finance education is relatively low.
- Comparison of the mean expenditure per pupil in fixed international prices (purchasing power parity (PPP)) shows that in Israel the mean expenditure per pupil at all educational levels is lower than the OECD average. The gap is especially wide in post-primary and higher education, at 12 568 in Israel compared with 18 239 in the OECD, and in pre-primary education, at 3 953 in Israel compared with 6 254 in the OECD.
- The latest data (2010) show that the government, local authorities, funds and donations financed 80% of the expenditure on education, and households financed 20%.

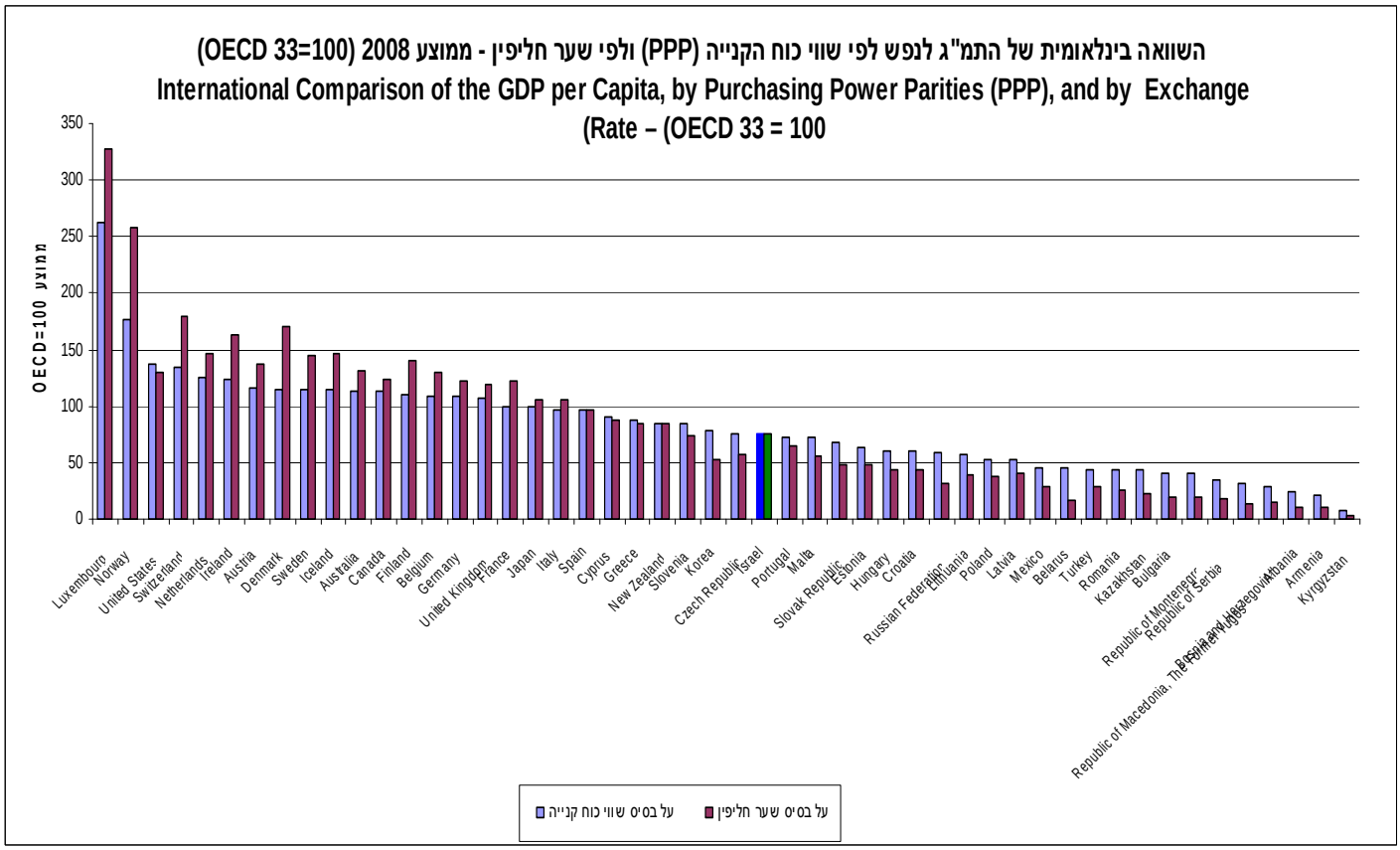
In 2008 the Israeli GDP index per head, in terms of purchasing power, was 75% of the mean GDP per capita in OECD countries overall. In 2011 the mean GDP per head in Israel was USD 28 546.

The 'actual individual consumption per head' (which is calculated in addition to the private consumption of households, including for services that the government provides them with personally, such as education or health services) in Israel was 71% of the OECD mean, a similar figure to those for Portugal (76%), Slovenia (75%) and Malta (73%).

[2] Population estimates exclude foreigners living in Israel.

[3] Others – including non-Arab Christians and those not classified by religion by the Ministry of the Interior.

Figure 2

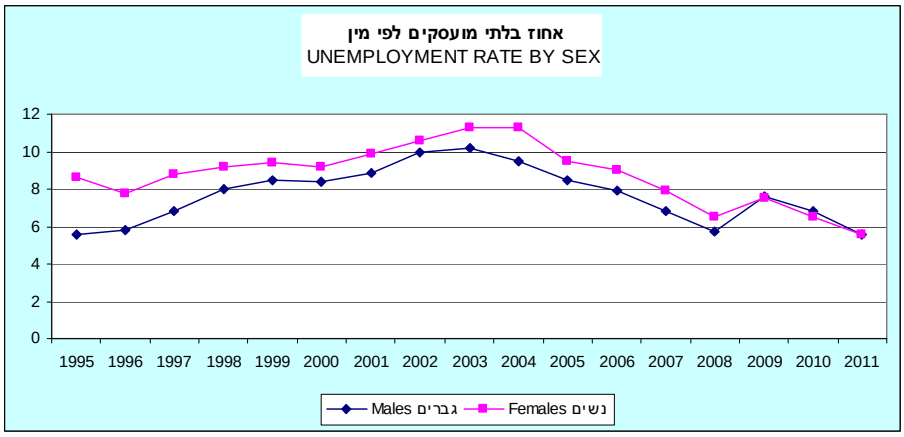


Source: Data from the Central Bureau of Statistics, Israeli Statistics Annual, 2010

In May 2012 the labour force consisted of 3.606 million people, of whom 3.352 million were employed and around 255 000 unemployed. Among those who were employed, 1.787 million were men and 1.566 million were women.

In 2011 the employment rate (the percentage of employed in the whole population) among those aged 15 and above was 54.1% (men 58.8%, women 49.7%). The employment rate has been increasing since 2005 (from 54.1% in 2005 to 58.8% in 2011), but there is a significant difference between the rates for men and women. The percentage of unemployed people in the labour force among those aged 15 and above is 5.6%, with no difference between men and women.

Figure 3: Unemployment rate by sex, 1995–2011



Source: Data from the Central Bureau of Statistics, Israeli Statistics Annual, 2011

Table 1: Segmentation of employed persons by economic sector and years of schooling, 2010 (in '000)
Source: Data from the Central Bureau of Statistics, Israeli Statistics Annual, 2011

Economic sector	Years of schooling / Population	0–4	5–8	9–10	11–12	13–15	16+
Total	2938.2	20.8	99.1	177.8	**966.8**	777.3	890.9
Agriculture	47.8	(1.4)	4.1	4.7	24.1	9.0	4.4
Industry (mining and manufacturing)	416.7	3.6	20.2	37.1	148.4	112.2	93.8
Electricity and water	20.3				6.1	5.5	7.4
Construction	157.4	(1.5)	16.0	23.8	70.6	31.7	13.7
Wholesale and retail trade	388.5	2.1	14.4	29.8	190.1	97.5	53.8
Catering services	134.7		7.1	10.7	68.8	35.4	11.8
Transport	191.2		7.4	15.4	92.0	48.0	27.4
Banking (insurance and financial institutions)	116.1				28.1	40.5	46.2
Business services	429.2	4.0	7.1	10.7	90.7	122.0	193.0
Public administration	134.6			3.2	40.5	41.8	47.1
Education	367.5	(1.0)	2.8	7.1	58.0	91.3	206.4
Health, welfare and social services	303.7	2.5	8.2	14.3	70.1	75.7	132.0
Community, societal and personal services	147.2	(1.0)	4.6	9.2	49.1	41.7	41.2
Household services by individuals	55.3	(1.1)	4.4	8.3	21.9	13.3	4.0

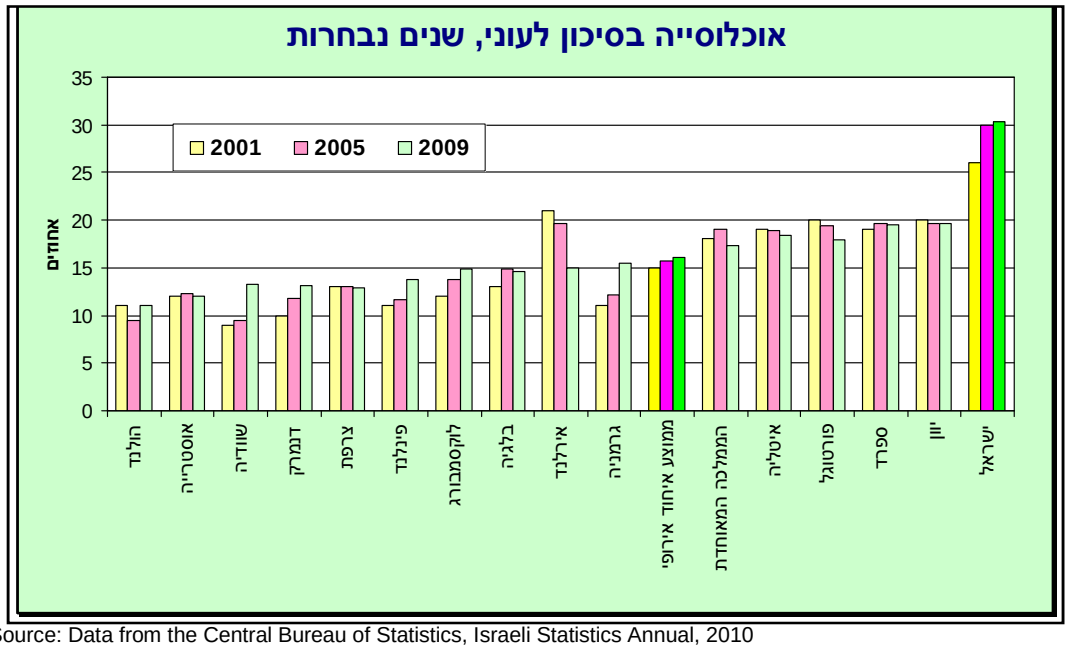
The table segments the employed population by occupation and years of education. According to the data, the highest rate of employment is in the business services sector (429.2 thousand, 14.6%), followed by industry (416.7 thousand, 14.2%). Over half of those working in industry have at least 13 years of education, with around 23% of all those employed in industry having at least 16 years of education (93.8 thousand).

Furthermore, the data indicate that over 73% of all those employed in the business services sector have at least 13 years of education, compared with the construction sector in which the majority have at most 11–12 years of schooling.

According to the Manufacturers' Association's data for 2011, in 2011, finance and business services made up around 40% of the business product, industry around 21%, trade, hotels and catering 14%, transport, warehousing and communication 11%, and construction only 7.5%. Furthermore, the main economic segments contributing to employment in the business sector are the industrial segment, which employs around 20% of those working in the economic sector, business services, which employ a further 20%, vehicle repairs and trade (19%), transport, warehousing and communication (9%), construction (8%), and hotel and catering services (7%).

The great heterogeneity of the Israeli population is almost without precedent in today's Western world. Poverty in Israel is distributed very unevenly across the population: the ultra-Orthodox and minority groups together make up around a quarter of the population, but represent more than half of the families living in poverty. The main factors behind such high rates of poverty derive from factors such as the very low employment rate among ultra-Orthodox men and Arab women, employment discrimination, cultural differences and high birth rates. Analysis and segmentation of poverty data show clearly that the shortage of suitable employment is one of the main immediate underlying factors (National Economic Council, 2007.)

Figure 4: Population at risk of poverty, selected years



Source: Data from the Central Bureau of Statistics, Israeli Statistics Annual, 2010

- Some 30% of Israel's population were at risk of poverty in 2009, compared with 26% in 2001. The percentage of the population at risk of poverty is relatively high compared with the figures for EU countries.
- The poverty rate among Israeli children is 29%, the highest in the OECD. The main factors involved are a high poverty rate among Israeli households with three or more children, and a high percentage of such households in Israel compared with other OECD countries.

Summary

In the long term, the main factor for ensuring economic growth and for reducing social inequalities is human capital, i.e. knowledge, education and the pool of skills. The challenge for the education and technological-vocational training systems is to increase significantly the number of students in technological-vocational education, and to raise the level of knowledge and skills of students and workers as a mechanism for enhancing output at work and economic growth. Educational mobility and the development of capabilities and skills are the basis for economic growth. The evidence includes, inter alia, data that indicate a link between level of education and the rate of participation in the labour market.

According to the Manufacturers' Association, the current employment market is characterised by a requirement for constant professionalisation, and demands consistent updating in technological and other developments. The prominent features of the Israeli economy and industry that represent significant components that drive economic growth are its sophisticated and innovative economy and industry, which are high-tech and ICT (information and communications technology)-intensive; the integration of advanced high-tech and ICT-intensive systems in all working environments; and dynamic and urgent changes to working systems and processes that derive, inter alia, from technological-scientific developments. We are witnessing a trend of a shortening in 'lifetimes' of technological generations that sometimes involve substantial changes in the working processes, knowledge and skills required from the worker; the introduction of new professions, economic and industrial sectors, such as professions in the field of water and alternative energies, which require the development of new and up-to-date curricula; increasing competition in the local and global markets; an increasing trend for globalisation – which requires additional skills and capabilities to be imparted, such as linguistic intercultural knowledge and sensitivity, and languages as a working tool, with an emphasis on English; collaboration between several team members, strengthening the multi- and interdisciplinary character of product development, with cooperation between several roles and sub-specialisations.

Owing to a pronounced need in Israeli society, many programmes for enhancing technological-vocational education are now in operation. Through these programmes, government departments are acting to support disadvantaged populations, with the emphasis on women, ultra-Orthodox groups and Arabs (see details about the programs in Chapter C). Furthermore, links between the Manufacturers' Association and the government have become closer in recent years, in order to adapt the curricula of schools and adult training to the needs of industry.

C. External efficiency: addressing social demands for VET and promoting social inclusion

This chapter describes the way in which technological-vocational education addresses social challenges and the advancement of specific populations.

According to the Central Bureau of Statistics: In the school year 2010/2011 there were 369 000 students enrolled in upper secondary education in Israel, whereas about 127 000 were enrolled in the technological track. The number enrolled in the technological track had risen by 4.4% since the previous school year, while the equivalent figure for those in the general track had increased by a modest 0.6%.

The percentage of students enrolled in the technological track (in the MoE) rose from 33.6% in 2009/2010 to 34.4% in 2010/2011.

In addition, in the school year 2010/2011 about 14 250 students were enrolled in the apprenticeship system supervised by the MoITAL, representing a rise of 7% in the figure for the previous year.

Taken together, students enrolled in either apprenticeships or the technological track accounted for 36.8% of all upper secondary students in 2010/2011.

In the school year 2010/2011 there were 4 700 additional students enrolled in programmes for technicians and practical engineers supervised by the MoE (13th and 14th Grades). This figure represents a 7% rise on the figure for the previous school year (2009/2010).

Science and Technology Administration, MoE

In order to meet the ministry's objectives and respond to the needs of the economy, the MoE has increased significantly the budget of the Science and Technology Administration. According to the head of the Science and Technology Administration: "Several central programmes have been implemented this year (2011/2012) that aim to strengthen technological education and underpin schools' capabilities in information and communication technology. The programmes will take the form of a significant additional budget that has been provided to the scientific-technological educational institutions." In fact, the budget amounts to NIS 450 million, of which NIS 150 million is a direct supplement for science education, including computer studies. The rest is intended for development programmes and to enhance the status of technological education (**People & Computers** magazine ,August 2012).

According to the head of the Technology Branch at the Science and Technology Administration, several core programmes have been introduced into schools, and there are several longitudinal programmes that are designed to support the core programmes.

Core programmes:

- 'Israel's scientific-technological reserve' programme aims to increase the numbers of high-performing students who complete their education having studied technological subjects at an advanced level (electronics, robotics, software engineering and biotechnology). The programme gives priority to students from Israel's social and geographic periphery. Priority is also given to schools that include in the programme the highest number of girls.
- Technician and matriculation program (TOV program) programme: those participating in this programme study to the end of the 12th Grade for matriculation and for a technician's diploma in subjects relevant to the economy where there is a shortage of technicians and practical engineers (electronics, machines, electricity and computers). The programme

starts in the 9th Grade with subjects that are in demand by the military and industry. It has been set up on the basis that the greatest shortages of technicians and practical engineers are in electricity, machines and electronics.

- New study routes have been developed in recent years for disadvantaged populations; these include the 'Integrating students in industry' programme intended for young people at risk. Students who fail to obtain a matriculation certificate at the end of their studies will gain a vocational diploma. In this programme the students go out of school once or twice a week to workshops and plants, where they learn the skills associated with the profession in a real-life technological environment. The intention is to provide employment prospects on the one hand, and post-secondary educational options on the other (continuing on to technician/practical engineer studies).
- 'Integrating ultra-Orthodox students in technological education' programme is intended for ultra-Orthodox young people who have dropped out of school.
- Study routes are being established that target the needs of disadvantaged populations (such as Arabic speakers, girls, populations at risk, ultra-Orthodox groups), covering such professions as ICT and qualified nursing; routes are also being developed according to sector-based needs.

Longitudinal programmes (the function of which is to support the aforementioned core programmes):

- Regional technological centres have been established.
- There is a scheme to integrate those leaving the high-tech sector into the teaching of technology in schools. The goal of this programme is to utilise Israel's scarce human resources and integrate them into schools.
- In order to improve the image of technological education, a campaign has been conducted in the mass media. The intention is to present such education as being essential in terms of employment prospects, for the welfare of the individual and society, while encouraging, advising, guiding and directing students and their parents, and fostering support for students.
- Every student and graduate of the technological educational system must carry out a final project that demonstrates interdisciplinary thinking, creativity, team work and self-discipline.

Senior Division for Vocational Training and Manpower Development, MoITAL

The Vocational Training Division is in charge of supervising and implementing vocational training courses for adults, through several main routes:

- vocational training day courses (for a government? diploma);
- vocational training evening courses (for vocational diplomas, mainly in business-related disciplines);
- industry training in the form of classes in the workplace and/or on-the-job training;
- training for technicians and practical engineers;
- training for secondary school students.

Adult training for technicians and practical engineers (not training in the 13th and 14th Grades, for which the MoE is responsible) takes place through MHT, the government's Institute for Technology and Science Training. Currently, MHT supervises around 75 colleges and extensions, which teach approximately 21 000 students who are working towards the technician or practical engineer qualifications. Courses are held either in the morning or as combined morning and evening lessons in a range of subjects, including architecture and interior design, biotechnology engineering, instrumentation and control, electricity,

electronics, software, machines and cooling/air-conditioning. The MoITAL's Vocational Training Division currently runs five government training centres (in Holon, Carmiel, Tamra, Tel-Arza and Ashkelon), offering mainly daytime courses. In addition, the division supervises institutions and colleges providing vocational training; these offer training on Fridays or in the evening, mainly in business-related subjects (see Appendix 1).

One method of financing vocational training that is now widespread is the voucher programme run by the Employment Service. The training voucher is worth 80% of the cost of the course up to a ceiling of NIS 7 000, and is given directly to the job seeker. The payment is made to the training provider in three instalments, one following the student's enrolment on the course, one on the student's completion of the course, and the balance after the student has completed a three-month work placement. This is intended to incentivise the job seeker to make an active effort to integrate into the workplace and stay on with the employer.

In addition to providing vocational training at training centres, the MoITAL uses training tools in the workplace, particularly in industry. Currently the two main workplace training routes are classes at the plant and on-the-job training.

Study classes at the plant: This approach is intended for the training of unemployed job seekers referred by the Employment Service. The training may take place entirely at the plant, or as a combination of theoretical studies at a recognised training centre and practical training at the plant. Training is offered in fields that are in demand in the economy, such as welding, various types of machining, and the timber sector. The company, in turn, is required to offer full-time positions to at least 66% of those graduating from the course.

On-the-job training: This is intended for the training of new workers, and involves an employer–employee relationship. The company must provide a mentor for each group of 3–10 workers. The plant receives state sponsorship for the mentor of NIS 3 000 per month (for the whole training period), and a subsidy of NIS 1 000 for each new worker during the training period (this is scheduled to increase to NIS 2 000 per month from 2012). This scheme is mainly suitable for small companies who wish to employ a small number of workers.

Over the years, government support for the vocational training of robust populations has been cut back considerably. Thus, governmental training that is budgeted through the Vocational Training Division covers only a very small proportion of the target population: those on long-term benefits (especially those receiving income assurance benefits), Arabs (especially women), ultra-Orthodox individuals (especially women, and people with a disability.

In 2010 the budget of the Vocational Training Division was NIS 618 794 million, in 2011 it was NIS 601 437 million, and in 2012 it was NIS 605 268 million.

Table 3: Employment status mapping by type of training and mean time from completion of studies

	Mean time from course completion	Employment status - population	Employed	Unemployed	Not in the labour force	Total
Short time-frames from completion of studies	**7 months**	Receiving vouchers through the Employment Service (2009–2007)	**%73.6**	%21.2	%5.2	%100.0
	18 months	Daytime training courses through the Vocational Training Division (2009–2007)	**%74.2**	%17.1	%8.7	%100.0
	18 months	Classes with placement through the Vocational Training Division (2009–2007)	**%64.0**	%26.6	%9.4	%100.0
Long time-frames from completion of studies	**5–10 years**	Daytime training courses through the Vocational Training Division (2002–1996)	**%77.5**	%9.1	%13.4	%100.0
	5 years	Daytime training courses – those dropping out of studies during 2004–2002	**%75.9**	%9.8	%14.3	%100.0
	5–11 years	Retraining of academics through the Training division in 2002–1996	**%80.2**	%9.7	%10.1	%100.0

Source: Presentation: Challenges and objectives in Vocational Training for Adult, Anna Gluck, September 2011

In order to continue to progress the technological-vocational education system in Israel, each government department has established priorities for further activities.

MoE

The main priorities for further improvement of technological-vocational education are:

- standardising the knowledge and competences for each subject;
- standardising vocational qualifications;
- offering a solution for professional development and careers;
- developing laboratories and workshops at schools and regional centres;
- improving human resources in teaching;
- developing ICT-based, accessible learning materials;
- developing universal competences.

MoITAL

The main priorities are:

- establishing prestigious vocational schools in which a wide range of technological subjects will be studied at all levels;
- enhancing and upgrading the MoITL's existing schools (including in the military and in industry), and increasing their prestige (while strengthening and improving links with industry, with emphasis on in-plant apprenticeships);
- doubling the number of students in schools supervised by the MoITL;
- adapting the curricula to the needs of the economy, in cooperation with employers;
- establishing a system of advanced workshops;
- changing the image of vocational education in Israel;

- simplifying processes and bureaucratic procedures associated with obtaining approval for training courses.

Manufacturers' Association

The main priorities are:

- identifying and mapping the workforce needs of the economy and industry, with an emphasis on the long term;
- developing and validating study tracks, subjects and programmes in accordance with the needs of the economy, in cooperation with employers;
- imparting the skills and competences required for the future employment market, such as independent learning skills, team work and cooperation, fostering technical entrepreneurship skills and creativity;
- establishing and upgrading the training centres, including the establishment of multi-age and multidisciplinary regional technological centres;
- dealing with human resources for teaching and instruction, through a system of further training for teachers at relevant places of work;
- conducting mass media campaigns, both to encourage employment and to change the image of technological-vocational education and training;
- establishing a public council for education and technological training.

Summary

To summarise, the MoE currently invests substantial resources in changing the image of technological-scientific education in Israel, in addition to developing and running innovative programmes adapted to the needs of the economy and industry and to various specific populations (ultra-Orthodox groups, girls etc).

In order to meet its objectives, the MoE has significantly increased the Science and Technology Administration's budget.

Moreover, in recent years the selection of study tracks in specific programmes, such as the TVB programme and the programme for integration of students in industry, is undertaken in cooperation with the Manufacturers' Association and the Israel Defence Forces (IDF). For some of the tracks, subject committees that include representatives from industry, the military and the education system have even been created. The purpose of these committees is to examine the existing curricula and adapt them to the needs of the economy, industry and society.

As part of secondary school studies, every technological-vocational track student must carry out a large final project. Its aim is to encourage among the students the development of higher-order competences such as critical thinking, team work and meeting deadlines.

Alongside these initiatives, the MoITL has developed a programme for enhancing vocational education, which has already resulted in an increase of 7% in the number of students within one year.

As part of adult training, a great deal of effort is devoted to the selection of disciplines for specialisation that are being offered in cooperation with industry, with the plant where the training takes place or with the Manufacturers' Association. Nonetheless, some Israeli companies have not yet internalised the importance of cooperation with vocational training institutions, and do not participate in long-term undertakings. As a result, it is difficult to find companies that are interested in cooperation. Usually, cooperation is undertaken for the purpose of meeting ad hoc requirements at the individual employer level, and is almost always conditional on government finance.

Moreover, cultural obstacles make it difficult for those populations whose labour force participation rates are low and whose poverty rates are high – namely ultra-Orthodox men and Arab women – to participate in vocational training.

At the same time, government support for vocational training in robust populations has been cut back considerably. Hence, the government-backed training that is financed through the Vocational Training Division covers only a very small proportion of the target population:

those in receipt of long-term benefits (mainly income assurance benefits), the Arab sector (with an emphasis on Arab women), the ultra-Orthodox sector (with an emphasis on ultra-Orthodox women), and people with disabilities.

In addition, there is a mismatch between the needs of employers and public opinion. Thus, for example, there is no response to the need for workers in labour-intensive productive industries, such as construction and agriculture, both because these industries suffer from low wages and a negative image, and because employers are able to take on unskilled foreign workers.

D. Internal quality and efficiency

This chapter deals with the quality of technological-vocational education at the basic and continuing levels, and covers such aspects as the definition of quality among the providers of technological-vocational education, the strengths and difficulties, the contribution of schools, colleges and faculties, the curricula, teachers' competences, equipment and supervision.

The quality of vocational-technological education at initial and continuing levels

According to the MoE, the quality of vocational-technological education is defined by the number of different fields of knowledge imparted to the students during their studies. Every student must carry out a final project that combines all the fields of knowledge studied.

Given the aspiration to increase the number of students who complete their technological education and are entitled to a matriculation certificate, it was decided to extend the modularity principle that allows each student to accumulate study units in every field of knowledge (from one to five study units) according to personal choice and ability. In addition to a matriculation certificate, all students in the technology track can also receive a technology certificate that demonstrates their education in this field and allows them to continue to a technician/practical engineer diploma. In each track, the student must study three subjects from different disciplines in the 10th–12th Grades, as follows:

1. a scientific subject (physics or chemistry or biology or technology sciences).
2. a leading subject.
3. a specialism.

Figure 5: Framework of technical – vocational education curriculum in high schools

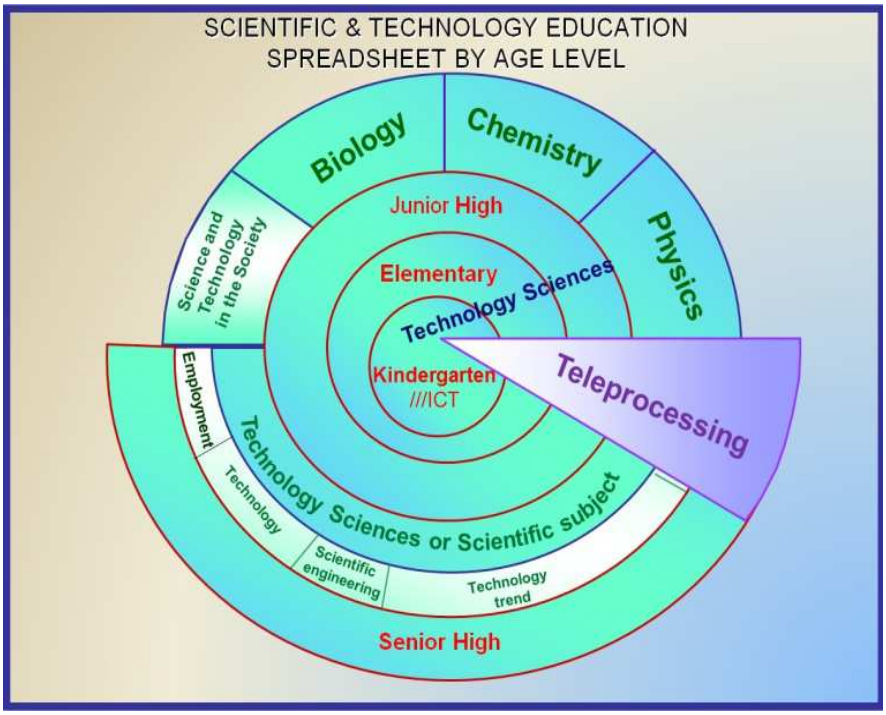
Source: Science and Technology Administration, MoE

According to the MoITL, the quality of vocational education is defined as the student's practical competence in the discipline acquired, beyond the theoretical requirements, as a condition for a vocational certificate.

The structure of vocational education in Israel

There are two official bodies in Israel with responsibility for vocational and technological education, namely the MoE and the MoITAL. Section A provides a detailed description, and Figure 1 shows the structure of vocational education in Israel, including the basic, general and higher levels.

Figure 6: Scientific and Technology Education – spread sheet by age level



The fields of science and technology are studied continuously from kindergarten right up to the end of secondary education (compulsory education). From high school studies onwards, these subjects are optional. Schools offer some of the streams, but it is up to students to make their own choices based on their wishes and aptitudes.

Lifelong adult training (18+), which is encouraged by the government, is provided in the following ways:

- by employers, according to their professional judgement;
- by the MoITL, with the aim of allowing unqualified or professionally qualified adults who wish to acquire a profession or retrain to upgrade in order to improve their employment opportunities and income;
- by MHT, the government's Institute for Technology and Science Training (see Section C for further details).

Adult training at the MoITAL's Manpower Training and Development Bureau encompasses five routes: professional retraining for academics, adult training (daytime route for job seekers, and 'business' route for evening courses and continuing education for the general public), training in industry and construction, support for women and developing job skills, and implementation of the Demobilised Soldiers Act. These activities rely on a dedicated government budget, which is intended to cover a significant percentage of the students' fees, and also to ensure the further proper development of the colleges and extensions. (See details of training and subjects in Appendix 1.)

Barriers that prevent vocational technological education graduates from continuing their studies at higher levels

Students may enrol in technician or practical engineer studies if they meet the prerequisites for these courses.

The MoE's admission requirement for these routes is 14 study units, as follows: seven study units that include three units in mathematics and three in English language; and seven study units for a technological certificate that includes three mandatory units in a leading subject. However, this condition is an obstacle, since quite a few students struggle with completing seven theoretical study units. Nonetheless, those who complete their practical engineer

studies with a grade of 80% and above can make them up to an academic qualification, provided they hold a full matriculation certificate.

The MoITL's prerequisite for adults for the technician or practical engineer route is as follows: full matriculation certificate, or partial matriculation certificate with a pass grade in the matriculation examinations, certified by the MoE, in mathematics and English (at a level of at least three units) and in the Hebrew subjects (at least one subject at a level of two matriculation units).

Students up to 30 years of age may go on to study for a bachelor's degree, provided they are entitled to a full matriculation certificate and passed a psychometric test. Those who have studied at a higher level of technological education (five study units) are entitled to a bonus when enrolling at university, which increases their chances of being admitted to higher education. There is a policy of corrective prioritisation according to social criteria that vary from time to time, for groups such as single mothers.

With regard to the academisation of the practical engineer qualification, there are some in the MoE who want to recognise the practical engineer subjects as a legitimate part of the subjects for a bachelor's degree in engineering.

Strengths and weaknesses in terms of quality and efficiency

The technological-vocational education networks are the implementing body and the owners of the schools in the network. Like the other types of ownership, such as municipalities, authorities, voluntary associations and private ownership, they are all under the supervision of the MoE or the MoITL.

The MoE for its part is acting in the following ways to establish quality standards for science and technology at the schools under its supervision: establishing a uniform curriculum for all Israeli pupils; holding national examinations (uniform assessment) for each subject; and using only textbooks produced by authorised content providers holding the MoE's standard mark. A new project that is being introduced this year is a digital textbooks pilot, currently run in elementary schools in the 7th and 8th Grades, with an emphasis on science subjects.

In addition, the MoE is examining innovative programmes for learning via projects, based on alternative assessment[4]. The Learning through Investigation pilot involves: in the elective subjects, at the highest study level (5 units), there is an option of one investigative unit;in the core subjects, two investigative unitsunits exchanging two mandatory units. During the 2011/2012 academic year Learning through Investigation was implemented in 40 fields of knowledge, and this also led to a change in external examinations. Some 283 institutions took part in the project; 28 further training courses were held on this topic; and 1 920 teachers participated in the programmes.

The MoE requires its teachers to hold academic qualifications, a teaching certificate and a teaching licence, and they must take active part in further training and knowledge updating. However, owing to the shortage of teachers of technological subjects, those holding practical engineer diplomas are also accepted.

The MoE and the Israeli Manufacturers' Association are acting together to increase the involvement of employers in determining the knowledge and competences required of technological education graduates.

One of the weaknesses that hinder the quality of technological education is its public image. Technological education is perceived as being for students who are weaker than those pursuing theoretical courses. With a view to changing this situation, the MoE has embarked on a comprehensive campaign to improve the image of technological education and attract more able students, promising employment prospects in professions that are in demand from the military and the economy.

[4] From the conference 'Education in Israel between two conflicting pedagogic conceptions', June 2012, presentation by Ms Dalia Fenig, Deputy Chair, Pedagogic Secretariat, MoE. Ms Fenig presented the Learning through Investigation pilot and addressed the need to change the assessment methods in this context.

Data on budgeted hours

MoE: budgeted hours per student in the technological route

The hourly budget allocation per student for technological education is higher than that for theoretical education, i.e. the cost of an hour's teaching in the former is higher. The main reasons for this are the requirement to study three elective subjects in technological education (compared with one in theoretical education), and the hours of laboratory and practical experience required for final projects in technological, though not in theoretical, education. Non-wage monthly expenditure is also higher in technological than in theoretical education.

According to the MoE's Pedagogic Directorate, the numbers of hours allocated per student in the 10th Grade in the various routes for the school year 2012/2013 are as follows:

- standard theoretical education – 1.45 hours per student per week;
- scientific theoretical education – 1.51 hours per student per week;
- Technological education – 1.84–2.00 hours per student per week (depending on the track).

MoITAL: budgeted hours per student

As a general rule, the MoITAL's budgeting method for vocational education systems for young people is budgeting per student.

For the school year 2012/2013 the hourly allocation per student in the 9th–12th Grades ranges between 2.8 and 3.8, depending on the study route, the age group and the vocational track. However, there is a limit on the maximum number of students, subject to the total budget allocated to all the aforementioned systems. Under an agreement between the MoITL and the Treasury, the budgeting is carried out according to a calculation of 20 students per class in the 9th and 10th Grades, and 18 students per class in the 11th and 12th Grades. This calculation is intended to achieve a balance between expenditure on a class and the revenue from budgeting for it.

The significance of this as a basis for calculation is that a class that is not full may result in a financial loss for the ownership organisation of that educational institution, whereas larger classes may produce a certain financial surplus; such a surplus is mostly used for overheads that are not budgeted for from another source. It should be noted that the MoITAL limits the maximum number of students per class to 26, on pedagogic grounds.

Teacher training and its correlation to the field of teaching

Supervising the relevance of training and lifelong professional development

The MoE is making available to teachers a range of professional development courses, instruction by instructors and innovation facilitators that includes long-term planning for their professional updating. There also exists a programme called Professional development for teachers in industry[5], and throughout the year there are also professional development courses organised by the Science and Technology Administration's principal inspectors in all the disciplines and fields (see the start of Section D).

The MoITAL, through the Department of Pedagogic Technological Development of the MEH (Teaching Tools Institute), provides professional development courses for teachers working in schools supervised by the MoITL and at the MoITL's training centres. The MoITL has four training centres, in Carmiel, Ashkelon, Jerusalem and Tamra (see details of teacher-training topics in Appendix 2).

[5] According to data from Ta'asiyeda, during the school year 2011/2012, 67 teachers underwent professional development in industry, whereas in the school year 2012/2013 – apparently following the Oz Li-Tmura reform, which requires teachers to work for 40 hours in their schools – this number dropped to 27. Apparently this type of professional development is no longer suitable for teachers; in the new reform structure they are unable to undertake professional development in industry (see Appendix 2).

Core preferences for improving the quality and efficiency of technological education

The MoE's preferences are determined in accordance with the knowledge and competences required in each subject, and also the requirements for further study for technician/practical engineer diplomas and further academic studies. Efficiency is examined in relation to the numbers of vocationally trained workers required by the economy and industry.

In order to produce a technological education system that is geared to employment in industry, the MoE states as its core objectives:

- the standardisation of knowledge and building the qualifications system;
- the development of ICT-based learning environments;
- the development of subject websites for teachers and students, including computerised tests and teaching and practising toolkits for students;
- the development of digital books, teacher training and professional development;
- the integration of students into industry, to enable them to gain experience and training on the most up-to-date machinery;
- the guiding of final projects;
- the equipping of learning environments.

The, head of the Science and Technology Administration, stated in an interview for this report that all the science education for which he is responsible is an integral part of the national ICT programme for adapting the education system to the 21st century. The programme, led by Minister of Education Mr Gideon Saar, is entering its third year; around 1 000 primary schools across Israel joined it last year, and it will be extended in the current school year to all junior high school. In addition, ICT processes will be strengthened in all the schools integrated so far.

the Science and Technology Administration is very encouraged by the sharp increase in the number of students embarking on software engineering studies; the number this year (2012) will be 17 732, compared with 16 507 in 2009. Moreover, he says, there has been an increase in the number of students in the ICT track, a new track that allows those studying three science units for matriculation the option of entering various high-tech professions. This track started with 50 students and now has about 4 000. This fulfils the view of the Science and Technology Administration: "Our goal is to produce the locomotive that leads technological education and increases the number of those studying the sciences at all levels, including five units". Compared with the OECD's policy and according to this measure, the growth rate in technological education in Israel is higher than the natural growth in the number of pupils entering the education system each year. According to Director of the Science and technology Administration, "We estimate that the growth trend in the numbers embarking on technological education will continue in the coming years, and forecast an annual increase of between 3 000 and 5 000 students."

The policy and actions pursued to achieve improvement in the quality and efficiency of technological education

Implementing the policy at the national and local level

The policy to improve quality and efficiency and to decide on priorities is updated and revised in accordance with the changes in Israel and in the global market. New thinking that leads to a reform takes place once per decade on average, with modification and continuous examination of each study subject.

The reform is led by subject committees whose members include representatives of manufacturers, academia, MoITL, IDF, teachers and principals. As part of the objective of increasing the number of students embarking on science and computer studies among those in the 7th and 8th Grades in mainstream schools, the MoE has launched a multi-year project for a scientific-technological reserve. Furthermore, the Science and Technology Administration is very proud of the success of the TVB programme (see Section C for further details). In addition, technological education allows secondary school graduates who have no

chance of matriculating to study in the Heznek La-Ta'asiya (Integrating students in industry) programme (see Section C for further details).

The correlation between future professions and market needs

There are various committees and studies that deal with forecasting the development of the economy and industry. These involve examination of needs in terms of personnel, knowledge, competences and sought-after professions and study tracks that need to be developed, upgraded or discontinued in accordance with the forecasts. The needs of the economy and industry in the region close to the school are given weight in the composition of the curricula, and the study tracks are introduced or discontinued according to a systemic view of Israel's entire economy.

The MoITAL, in cooperation with the Manufacturers' Association, is conducting a process of mapping companies, industrial sectors and sought-after professions that can assist in decisions on the study tracks and subjects required in a particular town. The mapping will have an effect on the level of investment and its targeting, in an attempt to strengthen that town's employment sources. For example, following local demand, a new curriculum focusing on railway professions will be implemented as a pilot in Dimona, and tourism professions are being strengthened in Tiberias.

"Embarking on such an undertaking requires multidisciplinary research which we don't have the tools to conduct at this stage. I assume this is the million dollar question (or much more than that), for which many players wish to receive an answer, and we as experts in education and learning cover only a narrow aspect of the phenomenon, which requires researching the labour market, employers etc. Such an investigation requires a multi-system approach within and outside the Central Bureau of Statistics, and would cost time and money.", CBS, 2012.

E. Governance and financing

This section deals with the macro issues: to what extent do governmental mechanisms, roles and financial budgets match the required changes in the technological-vocational education system?

Governmental responsibilities

The MoE prepares the knowledge infrastructure – schooling, theoretical infrastructure, and the development of capabilities, entrepreneurship and employment flexibility – while the MoITAL is in charge of updating the knowledge and competences of adults in accordance with the technological development in each discipline. It is not possible to draw up an organisational chart showing the MoE and MoITAL together, since these are two separate systems between which there are no hierarchical relationships. Therefore, they are represented by two separate charts (below).

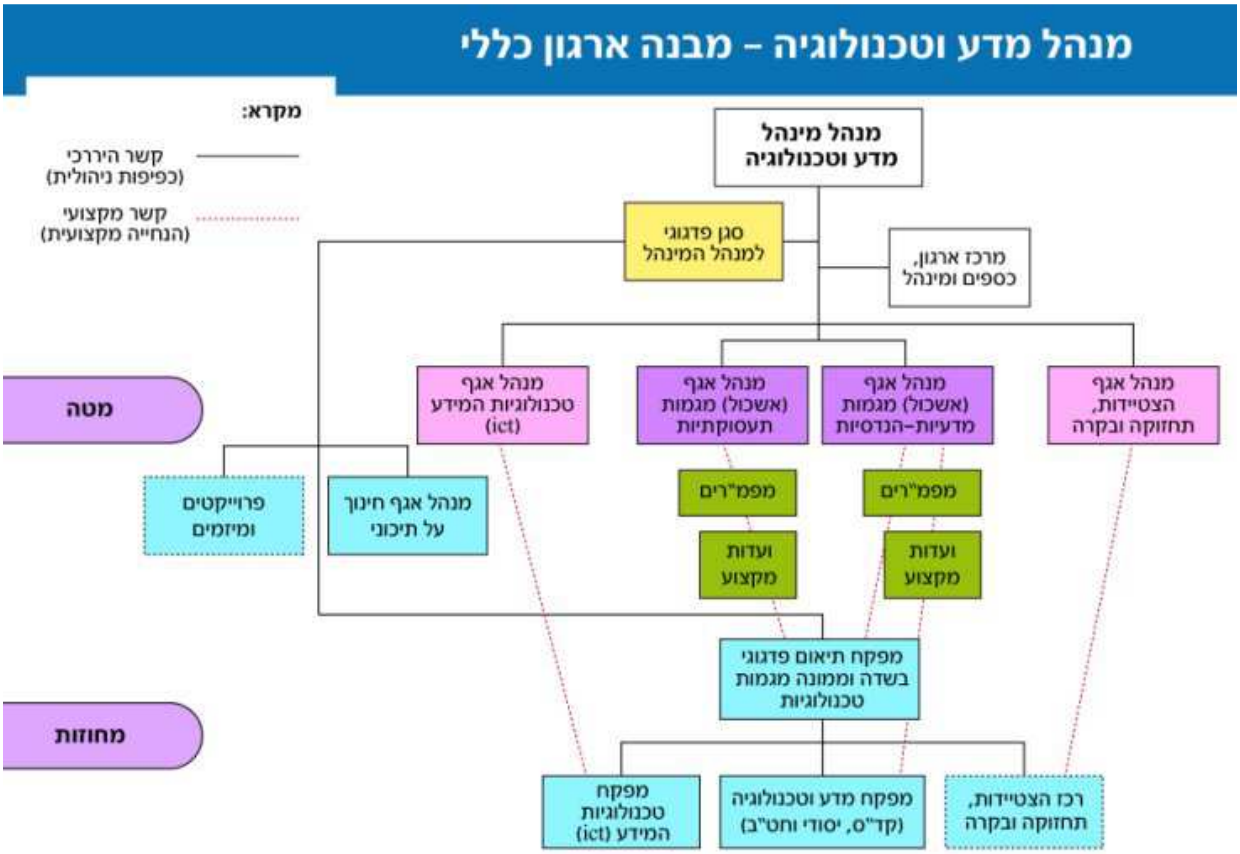
MoE

The bodies involved in planning are the consultative committee to the Science and Technology Administration; the Industry/MoE joint forum and the IDF/MoE joint forum; and the subject committees that include representatives of academia, the IDF, principals, school study track coordinators and teachers.

The bodies involved in the integration and supervision of the technological-vocational education system are: central subject inspectors (four across the country); technology team coordinators in each administrative district; and inspectors and instructors.

The bodies involved in assessment of the students of the technological-vocational education system are the examinations division; central subject inspectors; oral examiners; and final study/project assessors.

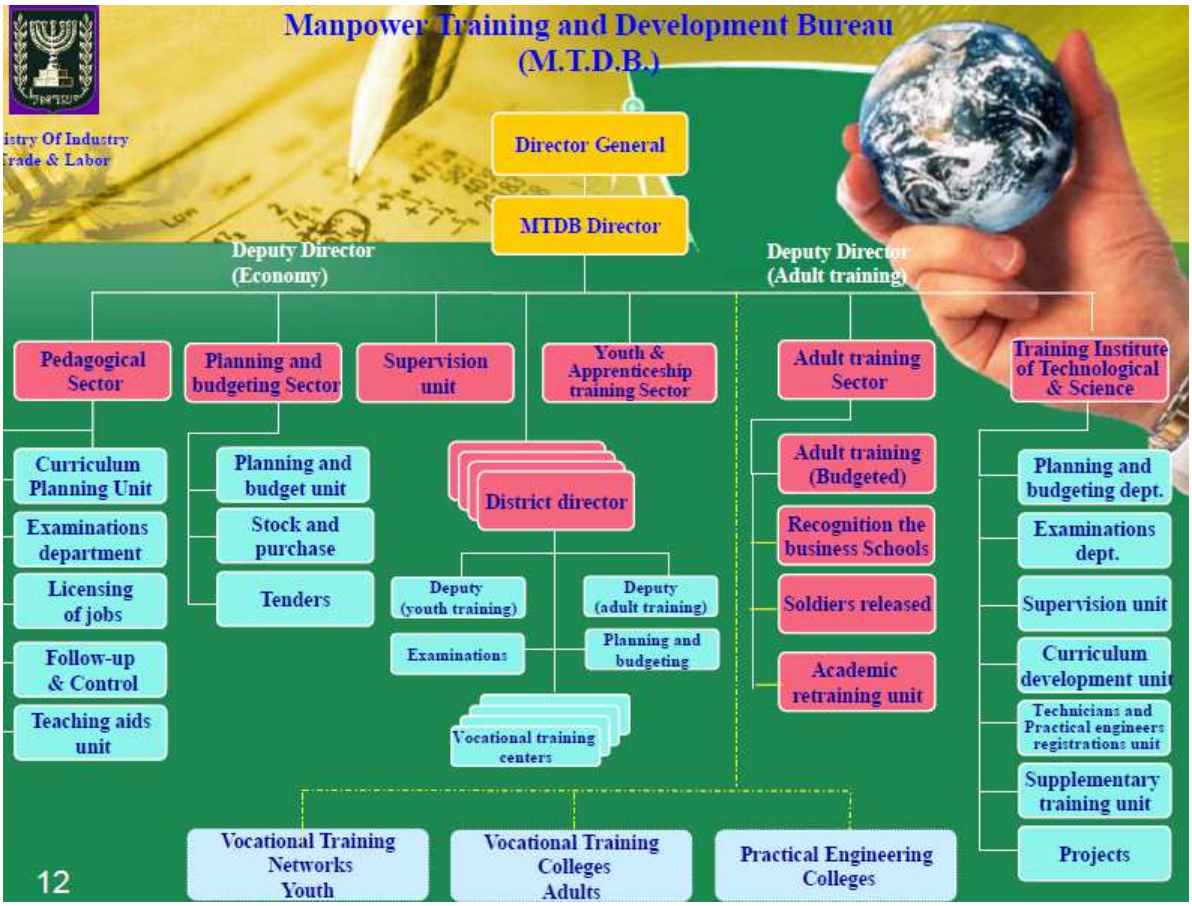
Diagram and analysis of the bodies involved in planning, integration, supervision and assessment of the MoE's technological-vocational education system



MoITAL

Under the Apprenticeship Act 1953, the Minister for Industry, Trade and Labour declares by order that a particular occupation (profession) shall be acquired by way of apprenticeship, a combination of study and work, with the students studying for three days a week and working for two or three days. The curricula in this track include general studies and theoretical and practical vocational studies. An apprentice who meets all the academic requirements and passes all the examinations in an ordinary apprenticeship track, or in an apprenticeship discipline in an industrial track, is entitled to a final certificate and a vocational certificate. A student who does not meet all the requirements but has obtained good results in the practical part is entitled to a Practical Final certificate. (A final certificate serves as an official document for recognising educational achievements under an agreement with the MoE.)

Below a diagram illustrating the structure of the Manpower Training and Development Bureau within the MoITAL



The MTBD is responsible for:

- entrepreneurship, consulting, implementation, guiding and control the operations in all tracks of training for young people, adults, academics wishing to retrain, and others.
- promoting the quality of profession and pedagogical, in conducting training, the level of standards in accordance with the needs of the economy, industry and the labour market.
- Control the curriculum implementation, matching teaching staff, evaluation of institutions and infrastructure for theoretical and technological curricula.

Current topics on the agenda in VET with regard to decentralisation and centralisation

MoE

The technological-vocational education system is a centralised system that allows some freedom of action and proactive options, which are manifested mainly through the development of alternative assessments, final studies and projects that provide a specific response that reflects the diversity among students and across the regions.

The main priorities for improving technological education are standardising knowledge in each subject, standardising vocational qualifications[6], addressing the needs in relation to professional development and careers, developing laboratories and workshops in the classroom and at regional centres, improving the teaching workforce, developing ICT-based and accessible learning materials, and developing universal competences.

With regard to technological-vocational education, the knowledge- and technology-based study tracks and subjects are renewed and developed on a regular basis on the MoE's

[6] For detailed information on the international qualifications pilot for computerisation and software, see Appendix 5.

initiative. Moreover, the technological-education networks AMAL, ORT and AMIT maintain pedagogic development training centres, the aim of which is to promote educational innovation, implement pedagogic methods and up-to-date educational technologies, and impart independent learning competences in ICT-based environments. The development centres provide professional development courses to technological education teachers, in addition to the regular courses held by the MoE. The centres serve as an authorised content provider of the MoE, and, inter alia, develop curricula, learning materials and ICT-based learning environments, for their schools and for the system as a whole. The various tracks in the technological route supervised by the MoE integrate new specialisms in accordance with the needs of the economy. An example of this is Autotech, a new study track that addresses developments in the transport industry and the demand for advanced garage staff who are knowledgeable in diagnostics and computerisation. This track is now part of the development of advanced learning materials. The actual development of the study tracks and programmes is carried out in two ways: the MoE and MoITL finance various developmental bodies to develop curricula and learning materials (including AMAL, ORT and the Centre for Educational Technology (CET)); in parallel, the MoE has a Curricula Division.

MoITL department of apprenticeship

According to the department of apprenticeship the education system is not supplying graduates with the technical competences required in the economy, including for the IDF, which is desperate for vocational personnel. The main issue on the agenda is a more flexible response on the part of the education system to employment needs; currently there is no direct link between the two, but only unplanned connections. There is no proper response to the large number of young people who are incapable of obtaining a matriculation certificate. The MoITL has started to cooperate with the Manufacturers' Association; the system is becoming less centralised, and a curriculum is being developed according to the demand.

Mechanisms for quality assurance at system level and at educational supplier level

Planning

Detailed aims and working plans for the Science and Technology Administration exist at national level. The curricula are created according to objectives and aims, and unique projects are also created in order to achieve these aims, such as the TVB programme, the Leap into Industry project and the scientific-technological reserve. At the regional level, each district at the MoE creates its own working programme from which the school programmes are derived. In the area of technological education, there is a match between the headquarters programmes and those of the districts, with the district level being responsible more for integration and application. At local level, each school creates a detailed annual working programme that includes aims, measurable objectives and implementation stages. The schools' working programmes address all the teaching subjects, including the technological ones.

Implementation

The MoE, through inspectors and instructors, checks the implementation of each of the projects and programmes, in cooperation with other stakeholders. Thus, for example, there is some degree of linkage with the Manufacturers' Association through the steering committees of each of the programmes on which their representative sits (for example, the TVB programme's steering committee). These committees include representatives from the large technological education networks ORT and AMAL, from the rural cooperative education system and sometimes from local government.

Assessment

The National Authority for Measurement and Assessment in Education (RAMA) is the education system's lead body and professional guide in the fields of measurement and assessment. RAMA deals with the creation and provision of assessment and measurement tools for the system as a whole, including efficiency and growth tests for schools (attainment tests) and the climate and pedagogical environment tests that accompany them, the international tests, and assessment tests for national educational projects. The attainment tests and the questionnaires focus on educational practice with the aim of improving it.

RAMA acts as a professional, objective and independent body that serves all the stakeholders both inside and outside the education system. In order to ensure that RAMA

can meet its purpose, it was established as an independent intra-governmental authority, with the status of a reinforced support unit at the MoE, and it reports directly to the Minister for Education. In the future its activities will be anchored in the RAMA Act.

Quality assurance is undertaken by subject inspectors, school inspectors, the examination system and assessment during and at the end of each academic year. The examinations include efficiency and growth tests for schools, internal trimester/semester tests, and (at the end of secondary schooling) matriculation and vocational examinations.

Conclusions

Every reform in the education system undergoes assessment while 'running', and is modified at the end of each academic year. After 10 years, the entire programme is examined and a new reform devised. For example, having been examined on the ground, the ToV programme benefited from being given extra hours, and the makeup of schools in the programme was modified.

The involvement of the social partners in statutory planning and strategy building

The strategic management plans of the MoE also encompass the strategic plan for technological education that is implemented in the MoE's schools, with the approval of the government. The vision for technological education is that is should be expanded and adapted to the 21st century, such that it forms an attractive alternative to theoretical education and provides a high-quality workforce that meets the challenges of industry. The programme for strengthening scientific-technological education was set up following years of decreasing budgets for technological education. Here, for the first time – in a move led by the Minister for Education, and his Director General – it was decided to reverse this trend.

The aims of the programme are to provide an educational offer for more students who wish to combine technology and applied-practical aspects during their studies, to create routes alongside the matriculation certificate that lead to employment in industry, and to expand and adapt the technological education system to the needs of industry (see details in Appendix 4).

The head of the Science and Technology Administration: "It is important to state that one of the objectives of technological education is to foster an entrepreneurial approach, together with examination of the timetable-based decision-making process. This is the current challenge for the technological education system."

The MoITL: "We are in the midst of a broad legislative process that will regulate statutory training for adults and young people, led by the Minister of Industry, Trade and Labour. The Apprenticeship Act will form part of this and will be integrated in it. The new Vocational Training Act will confer legal endorsement on all the qualifications."

The extent of investment in technological education

The Minister for Education, from an interview for Kesher Ayin [Eye Contact], the Teachers' Organisation's journal, in July 2012: "Following many years of damage to technological education, we have included the strengthening of technological disciplines in the programme of objectives for the government, and we are already beginning to see results: the number of students in the technological tracks has increased, we have launched technician tracks for matriculation, we have established regional technological centres, we have introduced new technological tracks and more. I know very well to what extent one needs to focus on this issue, and additional ways need to be found to promote the Science and Technology Administration, and obtain a great many resources for this."

MoE

Despite the cuts in the government's budget for 2013, the budget of the MoE's Science and Technology Administration has increased to NIS 400 million, compared with NIS 250 million in 2011 and NIS 30 million in 2009. This budget is designed to promote special programmes in science and technology, such as the national ICT programme. The budget also includes investments in special projects (Source: The Science and Technology Administration, MoE).

MoITL

The MoITL's budget for young people and adult training in 2010 was around NIS 619 million; in 2011 it was around NIS 601 million and in 2012 around NIS 605 million. (Source: The, Finance department, MoITAL).

Public and private investments needed to increase the efficiency of financial management and operations

MoE

one of the required changes is the privatisation of the education system, and the financial self-management of the schools by the ownerships and the districts.

MoITAL

There should be greater public investment by the state (or the funds) in technological education infrastructure, in equipment and workshops, in the schools and the regional centres.

Important priorities that are not manifested as part of the policy and current actions

The, head of the Science and Technology Administration, MoE: "The budgets earmarked for technological education are insufficient. We are mainly talking about a budget shortage in teaching hours in order to achieve technological education at all the levels we want. There is a shortage in equipment budgets and in budgets for teacher training and for retraining academics for technological education. We have not yet managed to create a significant cooperation with industry, nor qualification processes at the level we would have liked to achieve.

The MoITL: "It is difficult to train teachers in the vocational field; it is a question of policy and not only one of budget. It is necessary to change the policy on the qualification of teachers and instructors for technological education; we do not currently have the pedagogic tools for producing expert qualified instructors who will receive methodical pedagogic qualification for teaching and instructing, and these are subjects in which an academic degree is not relevant at all. It is necessary at least to allow academics to be admitted to a teaching course of study; owing to the policy over the past decade – that a teacher cannot be appointed without a bachelor's degree in the subject he or she is teaching – we are facing a shortage of teachers in applied subjects. There is an urgent need to progress a 'qualified instructor' track for every craftsman, in the subject he is teaching."

GOVERNANCE MATRIX

ELEMENTS OR FUNCTIONS WITHIN A VET SYSTEM	AUTHORITY Who are the actors legally in charge of this function? Have roles and responsibilities been adequately defined?	COMPETENCES Do actors have the technical competences that are needed to fulfil this function?	RESOURCES Do actors have adequate financial and human resources to fulfil this function?	ACCOUNTABILITY How are the actors in charge made accountable for the work done?
Policies and legislation				
Defining national VET and employment policies	The Knesset and the Israeli government, the MoE and MoITL, Manufacturers' Association and IDF	There exist skills and competences	There exist financial and human resources	Government departments State comptroller
Monitoring national VET and employment policies	MoE – control MoITL – employment policy	There exist skills and competences	There exist financial and human resources	Government departments State comptroller
Legislation for VET (both initial and continuing)	The Knesset, MoE – the Science and Technology Administration, principal inspectors, inspectors, instructors with a defined job definition	There exist skills and competences	There exist financial and human resources	Government departments State comptroller
Qualifications and curricula				
National, sectoral and regional skill and training needs analyses	MoE – qualification of the governmental and private qualification bodies' curricula MoITL – analysis of competences in the national level subject committees, which include representatives from academia, industry, and the MoE Training needs are adjusted at the national, regional and sectorial levels according to the players who are involved at each level	There exist skills and competences	There exist financial and human resources	Government departments State comptroller
Designing a list of occupations?	MoITL Not defined as its responsibility	There exist skills but there is a shortage of competences	Financial resources – exist Human resources – shortage	No report has been provided on the work done
Definition or revision of standards/qualifications	MoE, employers	There exist skills and competences	Financial resources – exist Human resources – none	The MoE's management and the state comptroller audit and demand a work plan report vs. performance
Development or revision of curricula (all types)	MoE	There exist skills and competences	Financial resources – exist Human resources – shortage	The MoE's management and the state comptroller audit and demand a work plan report vs. performance
Teachers and trainers				
Pre-service training and induction of VET teachers	MoE	There exist skills and competences	Financial resources – exist Human resources – shortage	The MoE's management and the state comptroller audit and demand a work plan report vs. performance
Recruitment of teachers	MoE, schools	There exist skills and competences	There exist financial resources	MoE's management, ownerships
In-service training of VET teachers	MoE	There exist skills and competences	There exist financial resources	MoE's management, ownerships

Teacher appraisal and career development	MoE	There exist skills and competences	There exist financial resources	MoE's management, ownerships According to Dr Ronit Ashkenazy (AMAL network), with effect from 2012, a substantial reform has been taking place in the working conditions of post-primary teachers. The reform also includes teacher assessment, including teachers in technological education.
VET providers				
Network of providers of - initial VET - continuing VET	MoE, education networks	There exist skills and competences	There exist financial resources	MoE's management, ownerships
Planning VET programmes and student numbers	MoE	There exist skills and competences	There exist financial resources	MoE's management, ownerships
Planning budgets for vocational schools	MoE	There exist skills and competences	There exist financial resources	MoE's management, ownerships
Dealing with school expenses-managing school	MoE	There exist skills and competences	There exist financial resources	MoE's management, ownerships
Learning materials and equipment				
Learning materials	MoE	There exist skills and competences	There are no financial or human resources	MoE's management, ownerships
Workshop equipment	MoE	There exist skills and competences	There are no financial or human resources	MoE's management, ownerships
Practical learning sites				
Liaison with employers	MoE, MoITL and employers	There exist skills and competences	There are financial resources, but no human resources	MoE's management, state comptroller
Practical training places within companies	MoE, MoITL and employers	There exist skills and competences	There are no financial or human resources	MoE's management, state comptroller
Apprenticeships	MoITL	There exist skills and competences	There are financial resources, but no human resources	MoITL's management, state comptroller
Assessment and certification				
Assessment of students' skills	MoE, qualifying bodies	There exist skills and competences	There exist financial resources, budgets and human resources	MoE, examinations division and qualifying bodies
Issuing certificates	MoE, qualifying bodies	There exist skills and competences	There exist financial resources, budgets and human resources	MoE, examinations division and qualifying bodies
Monitoring and impact				
Monitoring the quality of VET provision	MoE, employers, academic institutions and colleges	There exist skills and competences	There are no financial or human resources	MoE, examinations division and qualifying bodies
School-to-work transition surveys or tracer studies for graduates	MoITL	---	---	---

Research and innovation				
Research and innovation, including the transfer of innovations from pilot to system level	MoE / universities and research institutes	There exist competences	There are no financial or human resources	MoE's Director General
Donor coordination				
Efficient coordination of donors in VET	MoE	There exist skills and competences	There are no financial or human resources	MoE's management

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, *People and Computers*., 'The Science and Technology Administration's budget at the MoE has increased to NIS 400 million', , 28 August, 2012.

Interviews

1. Interview with Dr Ofer Rimon, Director of the Science and Technology Administration, MoE.
2. Interview with Mr Gershon Cohen, head of the Technology Branch, Science and Technology Administration, MoE.
3. Interview with Dr Roni Bernstein, in charge of apprenticeship and young people at MoITL.
4. Interview with Haim Portnoy, head of Education and Schooling Statistics Branch, CBS.
5. Interview with Iris Eden, training and professional development coordinator at the Technological-Pedagogic Development Department, Teaching Tools Institute, MoITL.
6. Interview with Dr Tal Lotan, director, Department of Education and Vocational Training, Industrialists' Association.
7. Interview with Micha Oren, Deputy CEO, Ta'asiyeda, Manufacturers' Association.

Links

1. State of Israel, Central Bureau of Statistics: www.cbs.gov.il/reader
2. The National Council for Research and Development, Ministry of Science and Technology: http://www.most.gov.il/Departments/NCRD/default.htm
3. Science and Technology Administration, MoE: http://cms.education.gov.il/EducationCMS/UNITS/MadaTech
4. Strategic programme for strengthening technological education, MoE: http://cms.education.gov.il/EducationCMS/Units/MadaTech/tochnit_astrategit
5. MoITL: http://www.moit.gov.il/NR/exeres/B0B48981-357D-446F-AFAC-91A358E93C87.htm
6. RAMA – National Network for Measurement and Assessment in Education: http://cms.education.gov.il/EducationCMS/Units/Rama/OdotRama/hok_rama.htm

Appendices

Appendix 1: Details of study and training fields for young people and adults, MoITL, for 2009/2010

(Source: MoITL chart)

Schools (for young people) that come under MoITL:

- 13 000 young people, of whom 4 500 are from the Arab sector and 200 are ultra-Orthodox (figures are approximate)
- 70 schools, of which 11 are on IDF bases, and 5 are in industry
- main study fields: automotive 3 800 students; electricity/electronics 1 600 students; administration 1 000 students (figures are approximate).

ITTS teaching institutions for technicians and practical engineers:

- 22 000 students, of whom 3 600 are from the Arab sector and 1 200 are ultra-Orthodox (figures are approximate)
- 77 colleges in total
- 25 existing study routes, the main ones being: computers 3 200 students; electricity 1 500 students; electronics 1 500 students; machines 2 500 students; architecture 2 400 students; industry and management 1 500 students; licensing of electricians 40 000 licences issued (student and licence figures are approximate).

Adult sector (18+): (figures are approximate)

- 13 000 students in daytime training (budgeted), from 1 January 2009 to the end of 2010
- main fields: electricity/electronics 2 000; catering 1 100; metals 1 200; carers 1 500.
- 50 000 students in non-budgeted evening classes.

Appendix 2: Study tracks in which professional development courses were offered in 2012 by the Teaching Tools Institute

- infant carers: 84 hours
- metals/machines: 112 hours
- mechanics and automotive electricians: 84 hours
- electricity and electronics: 16 hours
- air-conditioning: 16 hours
- construction sector teachers: 28 hours
- beauticians: 108 hours
- timber processing professions: 21 hours
- graphic design: 8 hours
- sewing and pattern-making: 8 hours
- administration: 56 hours
- confectionery: 28 hours
- hotels and catering: 28 hours.

Mean number of students on each course: 22

The courses are financed by MoITL.

The participants do not meet the cost. Once a year, a professional development committee looks at requests for courses from the professional inspectors of each track. The committee discusses each request and approves or rejects the course and the number of hours. Even though this is technological education and most of the courses

are for teachers in the technological tracks listed, the MoITL is strict about holding courses in the core subjects and dedicates time to dealing with the problems of students who have attention and concentration issues, teaching/learning strategies for those with learning difficulties, improving instruction/teaching methods for teachers in all subjects, courses in assessment and measurement, producing examinations, indicators, etc.

(Source: Iris Eden, training and professional development coordinator at the Technological-Pedagogic Development Department, Teaching Tools Institute, Training and Manpower Division, MoITL)

Appendix 3: Professional development for teachers in industry

The teachers leading technological education are exposed to current Israeli industry, to working processes and to the most advanced technologies in a wide variety of disciplines. Exposure to industry incorporates components for both lectures and practical experience, provides the teachers with theoretical knowledge and with competences in a variety of disciplines. The purpose of such professional development is to deepen the teachers' grasp of sophisticated technological innovations, and reduce the gap between the present and future needs of industry and the discipline-based curriculum.

All the meetings take place at industrial plants throughout Israel. The lecturers are managing directors in industry ,leading engineers in technological fields. The courses cover 120 hours, a total of 15 meetings – plus 40 hours of project guidance by professionals at the plants and a professional supervisor.

The number of teachers taking part in 2012 was 27, compared with 67 in 2011. The downward trend may be due to the launch of the Oz Li-Tmura reform, which requires teachers to spend 40 hours a week in their schools, so that their opportunities to attend external courses are limited.

Advanced studies subjects: The electricity sector in Israel, tour of production units, visit to an electric laboratory and experiencing a synchronisation simulator and mains generators, tour of the Caesarea switching unit. The nature of the industry, machining, from ordering to supply, leadership in education, tour of production department, five-axis computerised machining, what is a logistics centre, automation and control, green cooling systems, miniature electronic circuits, introduction to flash memories, meeting the electronic systems director, meeting R&D and engineering, tour of labs: electronics and electro-optics, robots in industry, tour of the clean room optical models, VPRO group 2 tour, semiconductor – leading manufacturers and wafer production processes and automation, how does a jet engine work?, tour the assembly division, engine assembly and renovation, quality assurance, engine parts production, casting, the electricity industry – a general survey, presentation of the FGD installation and the supervision and control activity in the chemical lab, renewable energies, innovation in technology, the importance of robotics and automation, from idea to production, marketing customer's requirements, the interaction between the Electricity Corporation and the marine environment and a tour of the biology lab, aspects of environmental protection, maintenance of installations in industry, electricity panels and standards, computerisation of electric systems, tour of plant and labs, the smart home, on the topic of – O.E.E. quality indices, yield and efficiency, the quality system, safety, analytical methods in industry.

Source: , Ta'asiyeda

Appendix 4: The strategic programme for strengthening technological education

The strategic programme for strengthening technological education includes these programmes:

1. Leap into Industry – a programme that provides employment prospects and integration capability for those students for whom in the past the system could find no solutions. The programme incorporates one day per week in industry.

2. The TVB (technician and matriculation) project – a programme run in cooperation with the Manufacturers' Association and the technological education networks. The programme takes students to the end of 12th Grade for a technician's diploma in professions that are in demand in the economy (electronics, machines and computers), together with a matriculation certificate.

3. Establishment of regional technology centres in the north and the south of the country – a measure aimed at increasing the number of technological education students who have access to a significant level of hands-on learning.

4. A mechanism for coordination with the IDF – a mechanism designed to adapt the scope and the relevance of technological education to the IDF's changing needs.

5. Enhancing the robotics field – exposure to the field of robotics in all age groups in order to encourage a high level of thinking and as a door to the world of technology.

6. Retraining those leaving the high-tech field for technological education together with cooperation the Ministry of Treasury – gradual retraining of staff from industry to technological education as part of the Treasury's programme to promote knowledge-based industries.

7. Incorporating the ultra-Orthodox sector into technological education – around 20 schools are enrolled for September 2012 (an increase from five schools in the pilot).

(Source: MoE, Science and Technology Administration
http://cms.education.gov.il/EducationCMS/Units/MadaTech/tochnit_astrategit/)

Appendix 5: Information regarding an international qualifications pilot, a joint venture of the MoE and MoITL in the ICT track, an article in Kav Lahinuch [Education Line]

The Science & Technology Administration's director is calling on industrialists to take responsibility for vocational educational routes; it is prepared to compensate those 'picking up the gauntlet'

Following a joint initiative of the Ministry of Education and the Ministry of Industry, Trade and Labour, graduates of computer and software studies programmes will soon also be granted a German vocational qualification. This will allow students to pursue their career in European countries, where German vocational qualifications are usually accepted. The initiative was led by Dr Avi Cohen, the Ministry of Education's principal inspector for computer sciences, when a professional German delegation visited Israel recently. In order to receive the qualification, a matching process between the topics studied for matriculation in software courses in Israel and the German qualification system was carried out.

In an interview for *Kav Lahinuch*, Dr Ofer Rimon, the Science and Technology Administration's director, stated that this is a pilot intended to be extended to other technological subjects. He said that currently the Administration is taking steps to enable as many technological tracks as possible to obtain international vocational qualifications. The Administration has started working intensively on this topic vis-à-vis the EU, especially Germany, where a whole system of vocational qualifications exists in technological secondary schools. According to Dr Rimon, the intention is that in the near future all the technological study tracks would have European qualifications, which would create wider employment prospects for their graduates.

Dr Rimon added that qualifications in the software field are not a very representative example, since the lion's share of graduates from this track go on to higher education. The Science and Technology Administration's main aim is that the vocational qualifications would be awarded to the graduates of less prestigious vocational tracks, especially low-tech ones, which many students finish with partial or no matriculation. These include subjects such as electricity, vehicle maintenance, hotel studies, child care, nursing and ICT.

The deployment of measures aimed at receiving the international qualification may improve the learning and training standards in these study routes in Israel. "In these fields we could be better, and the European standards will help us achieve this," said Dr Rimon.

Last year the Ministry of Education and the technological networks, ORT and AMAL, joined an EU project called the Torino Process. This involves the various countries presenting their education and vocational training systems, and learning from each other how they could be improved. According to Dr Rimon, the process has taught him that the principal weakness in Israel's technological-vocational education, compared with European countries, is that in Israel industry is not involved in the process of technological education. In contrast, in Germany the academic content of technological education is the Ministry of Education's responsibility, and the practical and applied studies the responsibility of industry. Rimon says that in Germany the industrialists' association has taken on the responsibility for practical training, including examinations, supervising students and training the instructors.

"I am still waiting for the first Israeli industrialist who agrees to take on responsibility for a particular practical training route. In return, we are willing to look into the possibility of paying the practical hours to the manufacturers as tuition fees (teaching hours). There is willingness on our side, but so far I have failed to find a partner from the other side, despite our approaches. We are still waiting," says Dr Rimon.