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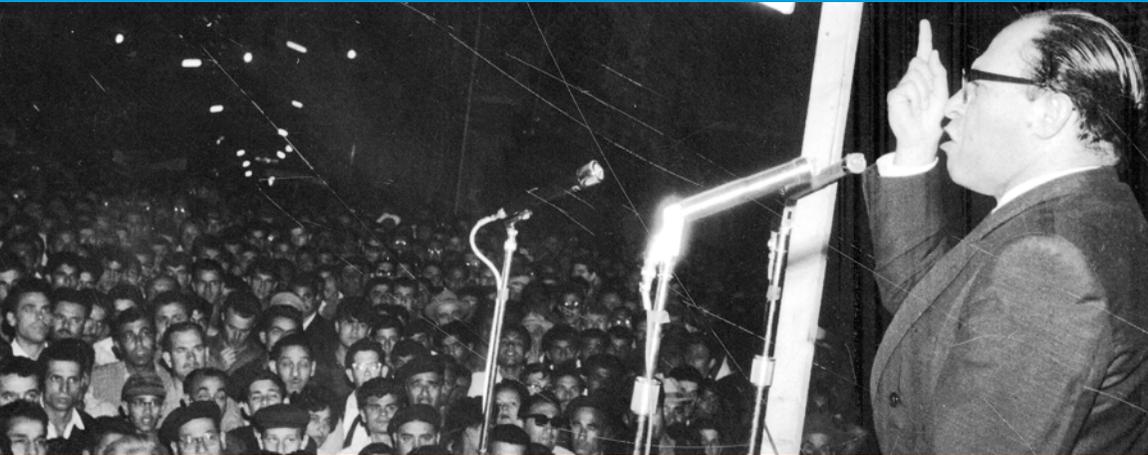
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Greening the Curriculum: Current Trends in Environmental Education in Israel's Public Schools

ABSTRACT

The importance of environmental education as part of national strategies for sustainability is recognized throughout the world. In recent years, substantial efforts and many millions of shekels have been invested in developing environmental education programs in Israel's schools. Unfortunately, outcomes in terms of pupils' environmental literacy are far from satisfying. This article reviews the origins of environmental education in Israel, considers its evolution, describes the present situation within Israel's educational system, as well as the major educational programs that are active in Israel today. Israel's educational goals remain centered on security, economics, and industrial needs, without internalizing the significance of environment quality as a critical factor for healthy global and national futures as well as a prerequisite for a sustainable prosperity. The article reviews ideas for improving existing levels of environmental education and increasing the commitment of teachers and schools to inculcating related knowledge and values.

INTRODUCTION—ORIGINS AND EVOLUTION OF ENVIRONMENTAL EDUCATION IN ISRAEL

THE INTELLECTUAL ANTECEDENTS OF ENVIRONMENTAL EDUCATION IN Israel have deep roots within the original Zionist ideologies that motivated the country's founding pioneers, even though these ideologies were diverse and highly politicized. A fundamental patriotism, rooted in a "land ethic" for the Jewish people, was a common denominator uniting the European immigrants. Indeed, once Jews began to arrive in Palestine at the start of

the twentieth century with aspirations of establishing an independent state, acquainting their children with their ancient homeland and inculcating them with a love of the new homeland by teaching about the land of Israel was a paramount educational priority. Israel's educational system today is largely influenced by the pre-State curriculum and its orientation, which saw incipient environmental classes (in the form of *Moledet* or homeland studies, and *Teva* or nature) as among the most important in its schools for both pupils and teachers.¹

Encouraging proximity and appreciation of nature was supported both by classroom theory and by extensive field trips by school children at every stage in their public schooling. For example, Mordechai Michaeli, who wrote of Zionist education in the 1920s, explained:

The pupil in the Land of Israel is not always imprisoned like the pupil in the "Cheder"—the religious Jewish European primary school. The school field trips expand his knowledge and his perception and increase his desire and activities.²

This focus, particularly in the early grades, continues to this day, leading to the common Israeli phenomenon of immigrant parents learning not only Hebrew grammar but the names of plants, birds, and insects from their children when they return from kindergarten.

Nature studies in the schools became part of the immigrant's socialization experience. Israeli sociologist Oz Almog writes:

If among the pioneer immigrants acquiring geographical expertise about the land of Israel was a tool for creating a childhood identity, for the locally born Israeli, the expertise became something of a status symbol, intended to express the superiority of the children over their parents' generation and that of new immigrants.³

The intense, romantic, idealization of nature produced a youth culture that Almog describes as "pantheistic", with reverence for nature serving as nothing less than secular religion. Yuval Dror argues that embedding biblical studies in schools, by secular teachers, for secular pupils,⁴ was designed to facilitate "personal growth".

In recent years, specific trends in Israel's approach to environmental education have been recognized. Associated events occur after a trend is already in motion. Therefore, events should be regarded as an expression of a "new" educational phase.⁵

Environmental philosopher Eilon Schwartz⁶ identifies three environmental paradigms evolving in Israel's environmental practices. The first paradigm Schwartz characterizes, "Nature Conservation", is rooted within traditional Zionist ideologies that urged new Jewish immigrants to "return and redeem the land of Israel", starting a vast national cultural movement of hiking and learning about the vegetation and the animals of the holy land. The Society for the Protection of Nature in Israel (SPNI), Israel's largest and one of the world oldest nature preservation NGOs, was founded due to conflicting perceptions between the spirit of "nature conservation" that was surging in the hearts of newly arrived citizens and the new state of Israel's needs for rapid development.⁷

During the educational system's nascent years, Zionist environmental ideologies were reflected in Israeli elementary schools in classes generally referred to as "nature studies". This was particularly apparent in the 1950s, but the same values can still be observed in today's school curriculum and its "Homeland" and "Knowledge of the Land" classes.⁸ The aim was and remains that every Israeli child should know and experience the natural and cultural history of Israel. Today the "Homeland" and "Knowledge of the Land" curricula incorporate three separate cultural outlines, for Israelis—Jewish, Arab, and Druze—based on ethnic heritage.⁹

According to Schwartz,¹⁰ the environmental perceptions that deeply influenced the Western world during the '60s and '70s were later embraced in Israel during the late-1980s and into the 1990s, culminating in the establishment of the Israel Ministry of Environmental Protection. This period is referred to as the second paradigm, one that is generically called "Environmental Science". New NGOs, whose activities emphasized pollution control and public health, emerged, while new academic departments for environmental research were established in Israeli universities. This environmental paradigm was more scientifically based and associated with the effect of pollution on human health. It did not take long for Israel's Ministry of Education (MoE) to restructure the school curriculum accordingly. The year 1994 was declared to be "Year of Environment" in Israel's educational system, aiming to introduce more schools to environmental issues, with substantial funds provided by the MoE to engage teachers in seminars and workshops.

As a result of this trend, the emphasis in schools soon changed; the new subject of "nature sciences" emerged, and later was simply called "science" as part of the public schools' STS (Science, Technology, and Society) program. At the same time, a parallel track called "technology" evolved in public schools, stemming from the earlier lessons offered in "crafts" or

“shop” training that provided an alternative to the more theoretical, university matriculation framework. Pupils underwent practical training to acquire various manual labor skills. As in the case of “science”, “technology” was merged with the STS program. New curricula were published for an integrated discipline, including specific topics and reading material for a separate curriculum in junior high¹¹ and elementary schools.¹²

Today, environmental studies are still offered within the framework of Science and Technology Studies, and include multidisciplinary topics from various science fields, as well as economic, social, and ethics issues. In both curricula, approximately one-quarter of the defined goals refers to human activities’ effect on the environment.¹³

Schwartz claims that the two early paradigms are not mutually exclusive and can co-exist. Yet both lack essential elements relating to the rapid development of Israel. The international concern for the environment that Israel’s curricula tapped into was informed by a steady stream of scientific developments and increased access to the enormous scope of knowledge that began to accumulate during the 1970s and 1980s. The result was fundamental change in perception of science studies within educational systems of many countries, including Israel. In light of these developments, greater importance was attributed to acquiring higher-order learning skills, such as understanding articles and working in a team to understand and solve problems.¹⁴

The transition from “nature studies” to STS was not easy to implement and required substantive orientation that was more “human” in its approach. For instance, teachers who taught “science and technology” had not been trained to focus on “environmental studies”, which often included ecological and social themes. The MoE, which suffered many funding cutbacks during past decades, found it difficult to allocate the necessary resources to upgrade teaching staff and reach the level and standards that it set for itself. Token efforts were made with the publication of the Ministerial CEO Circular 1996,¹⁵ and several years later in 2004, a “*Standards Document*”¹⁶ was published as a key Ministerial CEO Circular: “Implementation of Education for Sustainable Development in the Educational System”, formulated according to Israel Government Decision No. 246 (2003). The decision was part of the implementation of the resolutions adopted by the UN’s global sustainability conference in Johannesburg. It called on all ministries to participate in a strategic program for sustainable development that would allow the country to grow in an environmentally responsible way.

According to Schwartz,¹⁷ the third paradigm, “place-based environmentalism”, appeared in Israel in the late 1990s and remained the dominant

perspective during recent decades, reflecting Western world trends. Combining the advantages of the first two paradigms and considering their flaws, humans were now regarded as part of nature. The question changed from: whether humans should influence nature, to How should humans influence nature? This paradigm determined that agriculture, engineering, city planning, architecture, and culture are meeting places between humans and nature. Each should reflect an environmental orientation with consideration of the specific human/nature relationship, the societal needs of each place within each culture.

Today Israel's environmental education programs are a product of this evolution and this third phase. But they also reflect many of the idiosyncratic elements that characterized the country's early stages. Pupils in public schools have sleep-overs in hostels or Bedouin tents in Israel's rural periphery, and field trips that typically involve hiking. There is a relatively strong "taxonomic" component, learning flowers', birds', and hillsides' names. There is still an unmistakable "patriotic" element to teaching nature in Israel's elementary schools. Yet, the growing menu of environmental challenges facing Israel's urbanized population has filtered into the curriculum and into Israeli environmental education.

Since Israel emerged as a post-industrial economy, more than 90% of its residents live in cities and towns. Thus, the original, ruralist, naturalist orientation¹⁸ was supplemented by concern for urban environment in the schools. As environmental concerns emerged as a topic of interest in the international arena, Israel at a formal level was an engaged participant, leading to the importation of new themes and messages. In conventions, international pacts, and governmental decisions in Israel, environmental education was emphasized as a central component in national strategies (as it was around the world) for preserving environment and quality of life.¹⁹ In this sense, Israel's growing range of environmental education programs is also a reflection of global trends.

At its best, Israel's environmental education emphasizes values rather than simply theories, awareness rather than merely abstract thinking, and conscience rather than just technical efficiency. Its educational programs aspire to offer a broad, cultural experience, challenging young people to consider their very identity—the key educational elements Orr²⁰ and Sauvé²¹ characterized in their pioneer writings. But as this article describes, at present, environmental education in Israel falls short of its potential and the visions crafted by the growing number of educators and innovators.

ENVIRONMENTAL EDUCATION IN ISRAELI ELEMENTARY SCHOOLS

With this historic context, it is possible to consider the state of environmental education in Israel today. This section assesses the government's objectives in environmental education, the way these goals were met through the implementation of certain standards, the shortfalls in meeting these objectives, and the new methods that presently attempt to address those shortfalls.

In elementary schools, from first to sixth grade, "environmental quality studies" (the Hebrew phrase referring to Environmental Education) is listed as a compulsory topic, appearing in the aforementioned 2004 *Standards Document*.²² The subject is to be taught along with other themes under one of five areas of scientific knowledge. "Environmental quality studies" was reduced from being one of seven topics that were compulsory in the earlier, 1999 technology curriculum,²³ to being a subtopic in the new curriculum.

Accordingly, the *standards document* lists five substantive areas for elementary school programs:

- Materials sciences—substances and energy;
- Life sciences—the world of living creatures and human beings, their health and the quality of their life;
- Earth and the planetary sciences;
- Technology—the manmade world, information, and communication; and
- Environmental sciences—ecological systems and environmental quality.

The *Standards Document* defines the values and behavior about which it seeks to educate, and asserts:

The curriculum in science and technology emphasizes the need to address the implications of science and technology on the individual and on society in the present and in the future. Exposure to the moral and ideological implications that are related to current problems and issues will help to nurture values and behaviors, by taking personal and social responsibility as pupils and as future citizens.²⁴

According to the guidelines outlined in the *Standards Document*, the subject of the environment is integrated into other disciplines in an



“infusion” approach. This orientation refers to various conventional classes for which there is an affinity and natural interface with environmental issues. Environmental components are supposed to be embedded into the defined topics being taught. This approach seeks to synthesize disparate disciplines and subject matter. At the same time, a growing faction in Israel emerged that opposes teaching environmental quality studies as a separate unit.²⁵

The present approach to training teachers in “science and technology” starts with the recognition that most teachers in this field enter the educational system with at least a B.A. in a scientific subject (the majority of teachers in biology, and the minority in chemistry and physics). The MoE’s Internet site, journals, advanced courses, conferences, and study days are expected to provide updates and enhanced professionalization for these school teachers, enabling them to maintain competence as instructors of “science and technology”.

On the other hand, Goldman²⁶ reported a shortage of teachers with appropriate background for teaching environmental education if the subject is to embody the aforementioned “infusion” approach. Recent reports prepared for Israel’s parliament show an exacerbation in teacher shortage²⁷ due to lack of instructors qualified in environmental studies. Blum²⁸ contends that the multitude of disciplines required for teaching effectively in this field, the decrease in available advanced courses for teachers in recent years due to budget cutbacks, and teachers’ fear of new learning materials, are the central factors behind the failure to meet the mandatory curriculum targets and serve to hinder the integration of new environmental topics and orientations.

The *Standards Document*²⁹ guides Israel’s teachers, and assists them in making exclusive use of the learning materials approved by the MoE. Yet, a survey of books in the MoE’s pedagogical libraries revealed that the textbooks and workbooks published during the Environmental Quality Year in the educational system, 1994, were never updated.³⁰ This means that teachers and schools have to take personal initiative to receive the benefit of high quality educational materials and appropriate, up-to-date pedagogical tools. Many of them do not do so. Moreover, the MoE Director’s Circulars’ recommendations have yet to be implemented.

One of the goals of the *Standards Document*³¹ is to encourage environmental education in first-to-ninth grade pupils. Embedding the document into the educational system is expected to be a protracted process. Fortunately, it has already begun. Officials at Israel’s environmental ministry confirm that the *Standards Document* has influenced conditions

in classrooms and many schools have integrated it in their educational programs.³²

The MoE recommends that elementary school pupils should study science and technology six hours a week. Schools are required to devote at least three hours a week to teaching the core curriculum of science and technology. In practice, some schools choose to avoid Science and Technology studies altogether, allocating these hours to other content, such as religious classes. Most schools teach Science and Technology less than six weekly hours. In other cases the full six hours are taught, but it is impossible to ascertain how much of the curriculum's environmental contents are presented, if at all. At present, there is no accurate definition or benchmark specifying the desired scope of learning time that should be allocated to each topic. Each teacher chooses which subjects to teach and in what format. As a result of these dynamics, the National Science and Technology Supervisor has no way of knowing how many weekly hours these subjects are actually covered in a particular school. Given this state of affairs, the extent to which environmental studies are actually taught under the headline of science and technology cannot be ascertained.

Israeli children attend schools within a system that is divided into four fairly autonomous tracks: (a) Jewish secular schools, (b) Jewish "national religious" schools, (c) non-Jewish schools (Muslim, Christian, and Druze), and (d) Jewish Ultra-Orthodox. Therefore monitoring at the national level is complicated. Some of the tracks resist oversight by the central government. For example, the National Authority for Measurements and Evaluation in Education receives no information about weekly hours of science learning in the Jewish Ultra-Orthodox Educational track. The report of the Israel Ministry of Environment³³ on Promoting Education for Sustainability in the Haredi Sector (i.e., Ultra-Orthodox Educational track) describes total absence of Education for Sustainability in most Ultra-Orthodox schools and very little in the few that offer environmental themes at all. Israel's MoE department of National Authority for Measurements and Evaluation in Education conducts national "Meitsav" tests, evaluating acquired knowledge in schools. In 2006 they reported that only 2% of elementary schools meet the full 5.5 to 6.5 weekly hours recommended for science-oriented subjects. Approximately 10% reported 4.5 to 5.5 weekly hours. In the Jewish sector, approximately 66% of the schools reported 1.5 to 3.5 weekly hours devoted to teaching Science and Technology, as opposed to 75% of the schools in the Arab sector that reported 2.5 to 4.5 weekly hours.

The number of hours dedicated to science and/or environmental topics has not changed dramatically since the MoE last reported about it to the

Table 1: Learning hours in science and technology in Israel primary schools on 2006, according to sector, supervision and grade—
National Authority for Measurement and Evaluation in Education.

Educational Track	Weekly teaching hours for science	Weekly teaching hours for science					
		1st	2nd	3rd	4th	5th	6th
Jewish Secular	Not teaching science	0%	0%	0%	0%	0%	0%
Jewish National Religious		1%	1%	1%	2%	1%	2%
Non-Jewish		1%	1%	0%	0%	0%	0%
Jewish Secular	0.5–1.5 hours	6%	6%	1%	1%	1%	0%
Jewish National Religious		10%	10%	5%	3%	3%	5%
Non-Jewish		1%	1%	0%	0%	0%	1%
Jewish Secular	1.5–2.5 hours	58%	57%	34%	26%	15%	24%
Jewish National Religious		58%	53%	45%	30%	29%	32%
Non-Jewish		52%	50%	14%	15%	6%	8%
Jewish Secular	2.5–3.5 hours	20%	26%	41%	45%	43%	42%
Jewish National Religious		21%	22%	29%	39%	34%	35%
Non-Jewish		21%	36%	42%	39%	36%	32%
Jewish Secular	3.5–4.5 hours	7%	9%	17%	20%	28%	22%
Jewish National Religious		11%	10%	16%	21%	19%	18%
Non-Jewish		7%	10%	35%	35%	42%	43%
Jewish Secular	4.5–5.5 hours	1%	1%	4%	6%	9%	9%
Jewish National Religious		2%	3%	3%	5%	11%	6%
Non-Jewish		1%	2%	8%	11%	13%	13%
Jewish Secular	5.5–6.5 hours	1%	1%	1%	2%	2%	2%
Jewish National Religious		1%	1%	1%	1%	2%	1%
Non-Jewish		1%	0%	0%	1%	2%	2%
Jewish Secular	6.5–7.5 hours	0%	0%	1%	0%	0%	1%
Jewish National Religious		0%	0%	0%	0%	0%	0%
Non-Jewish		0%	1%	0%	0%	0%	1%

Knesset in 2012.³⁴ This situation was well known to government officials who sought to amend it. In June 2007, an additional Educational Ministry Circular was released by its Director: “Environmental Education—A Central Challenge in the Educational System in Israel, Action Program for Promoting Environmental Education”.³⁵ According to this circular, elementary and junior high schools were required to emphasize environmental education in a multidisciplinary format during the 2007–2008 school year. Each pupil was to be exposed to a total scope of approximately thirty learning hours annually, from among the hours allocated to the associated topics (such as science and technology, agriculture, and geography). Two national courses were to be conducted in order to train sixty leading teachers about

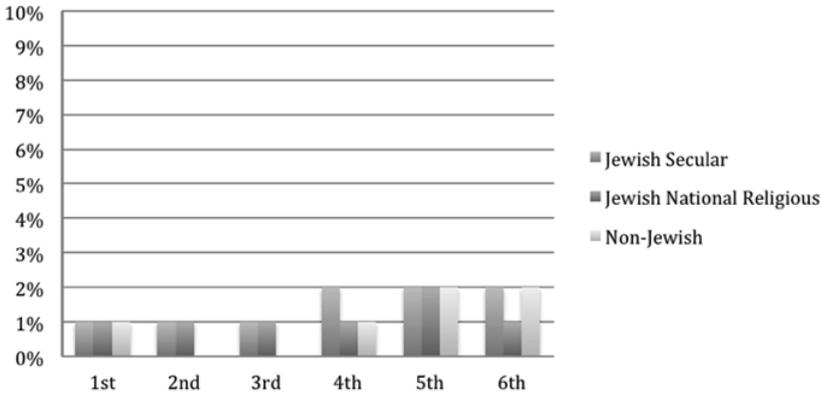


Illustration 1: Weekly hours devoted to Science and Technology:
% of schools teaching 5.5–6.5 in grades 1 to 6

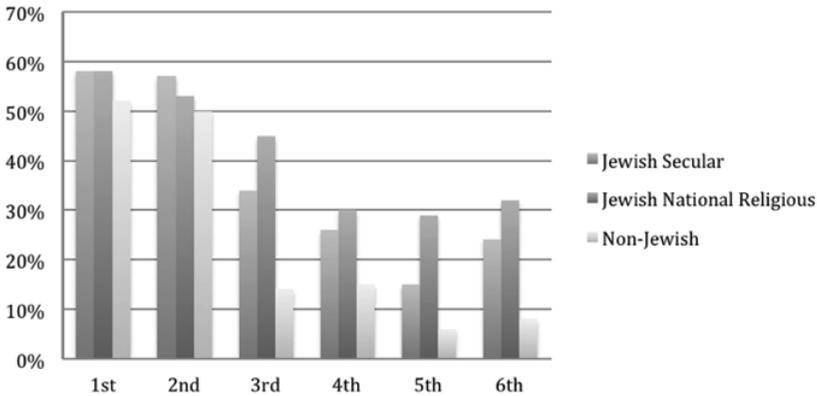


Illustration 2 Weekly hours devoted to Science and Technology:
% of schools teaching 1.5–2.5 in grades 1 to 6

these subjects, who were then train 1,200 additional teachers. A *Course Reader* was to be written and additional teaching materials published. In light of the workload faced by most teachers in Israel’s public school system along with other agendas that invariably arise and are promoted within the Israeli education system, it is not surprising that this method of knowledge dissemination did not prove efficacious.

An alternative *Environmental Education Program* was indeed established pursuant to the measures published in the 2007 CEO Circular. This program is a result of cooperation between Israel’s MoE and the



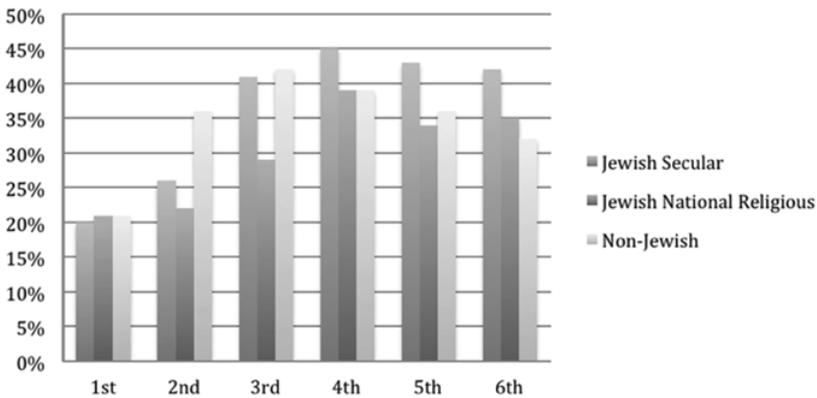


Illustration: 3 Weekly hours devoted to Science and Technology:
% of schools teaching 2.5-3.5 in grades 1 to 6

Ministry of Environmental Protection, appropriately called the “Ministers Program”. According to the program, environmental quality studies are to be an “organizing component” in schools. The MoE found that the leading schools in the field of the environment are those in which this topic is perceived as a central theme that can be addressed through a holistic, school-wide approach that goes beyond the classroom. The new program calls for a comprehensive staffing perspective, exposing all school teachers to approximately thirty advanced study hours. The program emphasizes school action on behalf of the community and utilizing resources in the adjacent environment. In addition, environmental topics such as diversity of species, alternative energy, and open spaces are taught. The committee in charge of the program includes representatives from the two ministries, Israeli academia, and the Society for the Protection of Nature.³⁶

ENVIRONMENTAL EDUCATION IN ISRAELI HIGH SCHOOLS

The fusion approach to environmental education during grades one-to-nine produces only modest exposure to the associated subject matters. But the state of affairs in grades ten to twelve is far worse. With the exception of secondary school students who opt to “major” in environmentally related topics, learning about the environment does not take place in Israel’s high schools.

Every year, approximately 100,000 pupils graduate Israel's educational system. Of these, 35–40,000 pupils choose to major in science and technology.³⁷ One of these subjects is the Matriculation Program in Environmental Sciences, established in 1983 according to a format that has changed little in the interim and follows the recommendations of an advisory committee comprised of professionals from diverse fields, who oversee the curriculum.³⁸ It is not among the more popular “majors” promoted among Israeli high schools. For example, in 2004, out of more than 640 high schools operating nationally, approximately 200 schools offered Environmental Sciences and 5,000 pupils took matriculation exams in this subject at basic “3” or advanced “5” point level every year.³⁹ To be sure, the number of pupils choosing this major is steadily growing from year to year: on the 2013 matriculation exams, 6042 pupils took the subject at basic “3” points level, and 4556 took the extra 2 points in order to reach the advanced “5” point level.⁴⁰ While only 20% of Israel's population is Israeli Arabs, 75% of the environmental sciences matriculation pupils are young Israeli Arabs.

The upshot of the present system is that, unlike the “infusion” orientation in elementary and junior high schools, environmental education is not systematically integrated into classes of other high school majors. This does not stem from an ideology or formal decision-making process involving serious planning and thinking, but rather is apparently the result of historic circumstances.⁴¹ Selection of a high school “major” limits any additional environmental sciences taught in the “earth sciences” and biology tracks (both alternative elective subjects for Matriculation exams), as well as selected topics in the “science and technology in society” major. These three subjects offer exposure to narrow aspects of environmental studies, at varying levels of depth. Even so, it is important to note that only about 10% of Israel's high school pupils participate in these three high school majors. The following is a brief description of the programmatic emphasis in each of the three environmentally related high school majors.

ENVIRONMENTAL SCIENCES

Environmental sciences studies as a matriculation course track is offered in two formats: 3 weekly study units, or in the more challenging track, 5 study units. In both levels, pupils are required to study one compulsory theoretical unit, which contains the core subject: “Ecological Systems and Biological Diversity”, along with one practical study unit entitled “Environmental Workshop”. As part of the environmental workshop, pupils visit three different sites and study them by collecting ecological data by themselves, using basic field methods, in order to enable them to characterize

that environment through a systemic-integrative program that integrates all the investigated factors and conditions. In the advanced 5 study units course, there is also an “Ecotop” unit (similar to the “Biotop” field studies unit in biology studies) in which pupils go out into the field and characterize functioning of a habitat. Most pupils in the environmental major opt for the 5 unit program. The remaining study units are primarily theoretical and can be chosen from six subjects: water resources, air resources, solid waste, noise and radiation, environmental planning and management, and environmental ethics.⁴² Pupils who choose the advanced program are committed to a matriculation exam in an additional scientific subject, at a level of at least three study units in chemistry, physics, or biology.⁴³

The substantive and teaching orientations in this subject largely do not address the social and ethical aspects of environmental issues, which constitute an important component of more advanced conceptions of environmental education.⁴⁴ In other words, the program would seem to conform closely to the “second” of Schwartz’s paradigms. Nevertheless, the deep understanding required to succeed in these matriculation exams, the multi-systemic nature of the content, and multi-disciplinary issues involved, can contribute to students’ understanding of the complex relationship between man and life support systems.

SCIENCE AND TECHNOLOGY IN SOCIETY

According to MoE policies enacted in June 1996, pupils who do not study at least one natural science or technological science subject must take a class entitled: “Science and Technology in Society—STS”.⁴⁵ STS emerged as part of the conclusions of a national commission chaired by the Weizmann Institute of Science president, noted physicist, Haim Harari.⁴⁶ The commission called on the educational system to impart scientific-technological literacy to every pupil as part of their compulsory studies. STS⁴⁷ is studied in three matriculation study units (<http://telem.openu.ac.il/mutav/>); 2,500 pupils take this subject each year.⁴⁸ One of the major problems in teaching this class is insufficient training among the teachers, whose background is often insufficient to teach the broad variety of topics, given the class’s multidisciplinary approach. According to Blum,⁴⁹ even though efforts have been made to expand and upgrade the scope of the STS curriculum, implementation has been delayed because additional advanced training is needed to train teachers in this field. Others contend that implementation is delayed because the MoE has not been interested in enforcing its own compulsory scientific subject rule for every pupil in Israel.⁵⁰ In short, there is a significant gap between actual implementation and recommendations

of the 1992 national commission⁵¹ and the Israel MoE circulars published over the years.⁵²

EARTH AND ENVIRONMENTAL SCIENCES

An additional 5-unit major in High School that includes environmental education components is “Earth and Environment Sciences”. The goal of this curriculum is to develop environmental insight. The program is based on the Earth Systems approach, and focuses on developing systemic thinking as the basis for developing environmental insight.⁵³ At present, the track is still relatively new and not widely available, offered in fewer than 15 high schools nationwide, with only several hundred pupils graduating with this matriculation major each year.

Other scientific disciplines offered as Israeli high school major fields of study, such as physics and chemistry, could include environmental themes but for the most part do not. This is unfortunate. There is growing recognition among science teachers regarding the importance of enabling future scientists and leaders to gain exposure to various disciplines and to understand the impact of their personal behavior on the environment. The recognition that today’s complex world requires literacy if not comprehension about a rich diversity of knowledge and familiarity with diverse disciplines, is of course valid beyond the environmental realm. In Europe, high school pupils study several science subjects simultaneously. By contrast, because of significant cutbacks in teaching hours in recent years, in Israel, even exceptional pupils typically only study a single scientific discipline in high school. As expressed by the chief scientist at Israel’s Ministry of Health during parliamentary hearings, the narrow thinking that results may cause damage to the future scientific capabilities of the state.⁵⁴

In a report by the Supreme Committee for Science and Technology Studies,⁵⁵ there is no reference to environmental subjects at all. The only considerations that drive educational objectives and content are economic and technological along with the country’s special defense needs. A similar approach can be identified in a Preparatory Document published by the Knesset’s Department of Information and Research prior to the joint meeting of the parliamentary Science and Technology Committee and the Committee of Education, Culture and Sports.⁵⁶ In short, the determination of high school pedagogical programs and their contents tend to be driven by capitalistic-economic and security oriented considerations rather than environmental/sustainability concerns.

According to a special report prepared by the Knesset’s Center for Information and Research,⁵⁷ the goals of science and technology education

Table 2: The number of students passed their matriculation exams in the three environmental professions offered by the Israeli educational system on 2009 to 2012—Information Systems Administration, Israel Ministry of Education Nov 2013.

Year	Environmental Sciences	Science and Technology in Society	Earth and Environment Sciences	Total number of students
2009	3941	1411	90	5442
2010	4287	1988	79	6354
2011	4486	1904	56	6446

are: 1) To give essential knowledge and tools for citizens of the twenty-first century—by this approach science and technology education is a basic need with no connection to the academic or professional livelihood of the pupil in the future; 2) To prepare pupils for defense, academic, and industrial needs of the state. But the contrast between this vision and Israel's actual educational reality is stark: data in the Center's publication indicate that more than half of Israel's pupils (approximately 60,000 high school pupils out of 100,000) graduate without any consequential scientific or technological knowledge. Furthermore, pupils who do acquire scientific or technological competence, attain this knowledge in a narrow and focused way that might prepare them for certain academic ventures but does not provide basic tools for meaningful environmental literacy. In short, at present, less than 10% of Israel's high school pupils receive a formal and systematic environmental education.

Detailed data about the breakdown of students studying science and technology confirm this contention: in a given year, approximately 11,000 Israeli youths take matriculation exams in biology, 9,000 in physics, and 8,000 in chemistry; 12,000 complete technological scientific engineering matriculation tests (such as electronics, machinery, computer sciences, engineering sciences) and 14,000 pupils fulfill requirements in technology studies (construction, architecture, inspection, and energy). Because of overlapping and double majors, cumulatively this amounts to 37,000 pupils per year.⁵⁸ The parliamentary Center for Information and Research of Israel indicates that this number actually represents an increase of 43%. But it also presents a challenging dynamic due to the aging of teachers in the work force and a steady reduction in the number of science teachers in the education system.

SUPPLEMENTARY ENVIRONMENTAL INITIATIVES IN ISRAELI SCHOOLS

Beyond the officially sanctioned environmental programs offered by the MoE, there are local initiatives in hundreds of schools, in which parents, teachers, or communities seek to provide additional instruction about environmental topics. Such schools can find a plethora of supplementary information sources and enrichment learning programs. The Ministry of Environmental Protection and the MoE run information centers with coordinators who accompany “green” schools and assist them in myriad environmental initiatives. Academic centers offer enrichment programs, as do non-governmental organizations such as the Society for the Protection of Nature in Israel, the Heschel Center for Environmental Leadership, and the CRB Fund. Some schools also cooperate with private industry that provides support for special programs. For instance, Intel has funded supplementary environmental instruction in several schools, and the Teva pharmaceutical conglomerate initiated a chemistry studies program in the city of Beer-Sheva, with several environmental applications. Israel’s Electricity Company and Makhteshim chemical company also support similar “green” educational enterprises. The educational initiatives that have emerged in the environmental field are in fact highly diverse. Some are long-term protracted initiatives and some only offer temporary enrichment. This makes comprehensive mapping of all special environmental programs taking place in Israeli schools practically impossible. Nonetheless, there are three leading national initiatives that provide supplementary programs at elementary schools:

- *Keepers of the Environment*—run by the Society for the Protection of Nature in Israel, a major national, conservation NGO;
- The *Green Network*—sponsored by the philanthropic organization the CRB Fund along with the Heschel Center for Environmental Thinking and Leadership, an environmental think tank; and
- *Green Schools*—overseen by the Ministry of Environmental Protection and the MoE.

The goal of all three programs is to inspire pupils to greater environmental involvement and activism, frequently with the cooperation and support of parents and other community groups. The curricula offered include theoretical studies, investigation of problems encountered in the

environment adjacent to the schools along with responsibility for individual actions and the pupils' environment.⁵⁹

The *Keepers of the Environment* program and the *Green Network* program rely on financial support (at tens thousands of dollars per year) for guiding and accompanying schools. This funding comes from donors as well as payments by parents in the schools themselves. Both frameworks are based on a teaching program that targets pupils and teachers. Related activities include excursions to the field and introducing children to local habitats and other nearby environmental amenities. In the government-sponsored supplementary program overseen by the Ministry for Environmental Protection and the MoE, participating schools are granted 10,000 shekels to assist them in the process of becoming a "Green School". This allocation is largely symbolic, as the associated activities in these schools require a far greater level of investment and training for educational staff. The governmental guidance and directives focus on training teachers through pedagogical materials provided by the two ministries that are distributed by regional learning centers.

Approximately 100 Israeli schools are full members of the non-government *Keepers of the Environment* and *Green Network* programs, with dozens more partially utilizing the educational materials. An additional 400 schools are members of the *Green Schools* program. In some cases there is an overlap, where schools opt to participate in the government's network while also offering the supplementary NGO programs. All told, there are several hundred elementary schools that benefit from supplementary teaching and enrichment programs about environmental quality. But this is only a fraction of the country's 2,600 elementary schools and does not include the Ultra-orthodox schools that rarely integrate environmental education in their religious curriculum. The following offers a brief description of these three programs.

*THE SOCIETY FOR THE PROTECTION OF NATURE IN ISRAEL (SPNI):
"KEEPERS OF THE ENVIRONMENT"*

Since 2000, SPNI has run a program called "Children Leading Change". This program requires commitment and involvement by school staff and the school's parents committee. The NGO program was designed according to pedagogical materials and topics selected for the curriculum based on MoE recommendations. The program's goals are to promote a feeling of closeness to nature and facilitate behavioral changes that will encourage responsible citizenship among school community—teachers, parents, and

pupils—as well as to develop children’s awareness about the environment and sense of commitment towards the natural world.

The paramount objective of the initiative is to enable pupils to internalize environmental values so they will take an active role in conservation efforts and be part of an active citizenry on two levels:

- sharing knowledge with the community through parents, newspaper articles, newsletters, etc.
- participating in field activities in cooperation with the community—for instance, setting up community gardens, creating hiking trails, or participating in local environmental campaigns.

As part of the “Children Leading Change” program, a Green Committee of pupils is elected in each school, accompanied by a teacher. The program encourages behavioral change in the school and participation in national issues and activism. A convention is held at the end of the school year, with different thematic emphasis at each gathering, seeking to acquaint children from different sectors in Israeli society (i.e., religious, secular, Jewish, Arab) with each other and their environmental priorities. The program strives to empower children who work for the environment and to increase their awareness and ability to cooperate with local authorities in addressing environmental issues. The “Keepers of the Environment” program is active as both formal and informal educational frameworks in Israel’s central cities as well as in its periphery. The rationale behind the program is that teachers and pupils should go through a practical process that involves interaction with their community. The program relies on cooperation between the Society for the Protection of Nature, the municipal authorities, Israel’s Ministry of Environmental Protection, and school staff.

THE CRB FUND AND HESCHEL CENTER: “GREEN NETWORK”

The goal of the “Green Network” is to provide children with the ability to shape their world through environmental consciousness as well as to reinforce and lead teachers and pupils to take greater responsibility, in order to awaken them to active citizenship. The network encourages forming affiliations to expedite educational-environmental action within the school community, and between communities of different schools, environmental activists, and various professionals and educators. Through the shared activity of three to four schools in the same area, a sense of connection between diverse groups within a single community is fostered to reinforce connections among pupils from the school. The focus of the program involves

external environment, and pupils frequently leave the classroom and go out into the complex environment of biosphere. Work is carried out in small groups, in order to increase sense of solidarity between teachers and pupils in each group and to encourage growth of local leadership.

*ISRAEL MINISTRY OF ENVIRONMENTAL PROTECTION AND THE
MINISTRY OF EDUCATION: "GREEN SCHOOLS"*

"Green schools" were established as part of the national initiative to promote sustainable development, and are operated jointly by the MoE, the Nature and Parks Authority, the Green Network, the Technion—Israel Institute of Technology, and the Society for the Protection of Nature.

Schools that join the "Green School" network receive an annual budget of approximately 10,000 shekels for implementing the program in cooperation with their student council and parents. The program encompasses three areas: the curriculum (ensuring environmental content in the classroom), community ("adopting" a site, where hands-on activity in coordination with local authorities takes place), and economics (involving the optimal use of resources and energy consumed in the school with the goal of decreasing the associated ecological footprint).

CONCLUSIONS: PROSPECTS FOR PROGRESS IN ISRAEL'S ENVIRONMENTAL EDUCATION

To some extent "making the best with modest means" used to be, and is, a central aspect in Israel's reality as young country with numerous challenges. Notwithstanding the chronic shortfall in teaching hours and resources, in recent years, environmental education has grown throughout Israel's public school system. The MoE and the Ministry of Environmental Protection have developed new programs. In addition there are literally hundreds of schools that have programs that are either run or are assisted by non-governmental groups and companies. Despite this positive direction, however, national reviews of environmental literacy among elementary and high school students in Israel suggest that the results of environmental education are disappointing and that the present system lacks a unifying vision and pedagogical strategy.⁶⁰ Recent research using quantitative methods conducted in Israel shows major gaps in environmental literacy among school children and generally low environmental literacy in Israeli schools.⁶¹

The overall picture leaves much room for improvement: more than five percent of the pupils choose to major in the subject and take matriculation

examinations in environmental studies. The Science and Technology in Society program, which is supposed to provide supplementary exposure to environmental topics for those who do not study science and technology and to address the subject of environmental quality, fails to reach a significant percentage of Israel's pupils. In short, most Israeli secondary school students do not even receive modest environmental education during their three years in high school. Primary environmental education is often more meaningful, but implementation is highly uneven and fluctuates among schools. There is a sense among experts that the country could do much better.

This situation is not unique to Israel. The 2009 Bonn Declaration calls for action that will “re-orient education and training systems to address sustainability concerns through coherent policies at national and local levels”⁶² and “reorient curriculum and teacher education programs to integrate ESD into both pre-service and in-service programs”.⁶³

Israel's supplementary programs in elementary schools for environmental education provide a partial solution in those schools that choose to invite them in—at their own initiative—and often at their own expense. They expand children's environmental education beyond the MoE's core curriculum and have a strong experiential component. These programs reach several hundreds of schools out of thousands in Israel. In addition, there are many other formal and informal environmental education opportunities, on a smaller scale. Many of these are temporary, while some are funded by private groups or companies, often with the encouragement of the local municipalities. Needless to say, for those schools involved in these programs, supplementary initiatives are a far more powerful force in formulating the environmental identity of children than Israel's formal, standardized curriculum.

Governmental funding, philanthropy, and local communities can expand the scope of these programs and the number of children who benefit from the profound message and experiences they offer. But they are no replacement for reform in formal environmental education. The existence of two fundamentally different approaches in the curriculum (“infusion” during grades one-to-nine and an “independent major” in high school) as mentioned, appears to be the result of almost arbitrary historical circumstances and needs to be reconsidered.⁶⁴

What are the prospects for upgrading the educational system's environmental performance in Israel? There have been several proposals made during recent years that will be briefly reviewed. There is much agreement that engaging teachers is a key strategic objective that must be better

pursued to this end. But at the same time, many associated questions are unresolved: The role and level of autonomy of teachers and schools in the country have been well-debated over the last century, especially over the vexing question: to what degree should teachers have a say regarding the contents of their classes?⁶⁵ Only a centrally supported, well-established effort to educate for environmentally conscious citizenship will enable profound educational achievements.

A Position Paper for Environmental Education Policy in Israel prepared in 2003 for the Ministry of Environment by eminent environmental education experts considered possible reform. Its conclusions remain germane today:

It is difficult to receive a clear picture from authorities in the Ministry of Education, which will reflect the reality both in relation to the existing situation and with regards to the future direction of environmental education in the Ministry of Education. This reality reflects a lack of systemic vision and coordination between the various authorities and the tensions that exist in relation to this subject.⁶⁶

This saddening reality is valid to this day. The position paper identifies a paradox: on one hand, there has been dramatically increased interest in the environment as a relevant societal issue, while on the other hand, in practice, it is not included among the central, compulsory elements of the public school curriculum. As a result, the Department of Education at the Ministry of Environmental Protection is stepping up to fill the gaps as best as it can, along with NGOs. Nonetheless, pupils are not exposed to environmental education in a systematic, continuous, and coherent way during their school years. The report recommends that a *national public committee* be established, offering a framework that considers the definition and desirable form of environmental education in Israel. The *committee's* recommendations should include methods for applying its ideas in the educational system and should be manifested in budgets, teaching programs, and curricula that would establish environmental education as a compulsory component of school curriculum for pupils of all ages. The committee should comprise experts from the MoE, the Ministry of Environmental Protection, and representatives of academia and NGOs that have accumulated rich environmental education experience over the years.

In 2009, responding to calls by the supervisor of Science and Technology at the MoE for greater involvement by the academic community, the Ministry's Mofet Institute founded a think tank for embedding sustainable

education in teacher-training academic centers. Members of the think tank include representatives of all teacher-training facilities in Israel, the MoE, and the Ministry of Environmental Protection. Even though the initiative does not offer a comprehensive response for the reform recommended by the Position Paper for Environmental Education Policy in Israel,⁶⁷ such recommendations constitute a positive development. During recent years, substantial work has been done among teacher-training academic institutes operating throughout Israel. Most academic centers host staff and student groups devoted to greening campuses and developing a teaching force with capabilities and confidence to educate for sustainability.⁶⁸

Technion Professor Revital Tal also recommends that environmental education be declared a compulsory subject for every Israeli pupil, beginning with pre-elementary lessons and continuing throughout their academic education. In addition, she recommends that a committee be established to define environmental literacy and advise guidelines for implementing an environmental education program at the MoE.⁶⁹ The program should involve activating appropriate training programs for teachers, environmental education in the community by the local municipalities, and establishing an Israeli professional research association for environmental education.

In light of the aforementioned recommendations, an Israeli professional research association for environmental education was established in 2008 under the Heschel Center for Environmental Thinking and Leadership, bringing Israeli environmental education researchers together every several months. The Israel Ministry of Environmental Protection, for the first time, began to fund academic research initiatives focusing on environmental education.

It is difficult to avoid the conclusion that an underlying part of the problem involves environmental education's low level of prestige. As a result, most pupils still graduate without having been directly exposed to meaningful environmental experience. Most schools fall far short of the recommended number of hours for teaching environmental education. In addition, there is a dearth of teachers who have received appropriate training. These constitute significant obstacles to running successful environmental education programs.

As long as Israel does not prioritize environmental studies and establish a prestigious association overseeing educational and political framework (comparable to the Supreme Committee for Science and Technology Studies,⁷⁰ Committee of Education, and the Committee of Science and Technology,⁷¹ Israel parliament's Department of Research and Information⁷²) it will never enjoy an elevated status. If Israel's educational goals

remain centered around the security and industrial needs of the country, there is little hope for significant improvement in the extent and quality of environmental education.

In practice, prestige is also a function of funding. Linder reports that between 2008 and 2011 the budget allocation for environmental education under the Ministry of Environmental Protection increased seven fold.⁷³ During the three years following 2011, the budget remained the same with minor increases each year.⁷⁴

Institutional integration is another essential objective. Here the situation is more encouraging. Collaboration between government ministries remains complicated, including two competing agencies overseeing Education and Environment. These dynamics remain part of the unfortunate institutional legacy left by Israel's governmental structure during the 1970s.⁷⁵ Nonetheless, recently several joint efforts have led to improved educational methods for environmental education as well as a process of greening Israel's public schools.⁷⁶ One can argue that recent cooperation between the MoE and Ministry of Environmental Protection is in fact unprecedented, influencing 400 green schools, 600 green kindergartens, and 19 green universities and colleges. Impressive as they are, educational initiatives involving "greening" of schools do not fully respond to the recommendations that the MoE set for itself: complying with minimum number of weekly hours recommended for scientific classes for elementary level pupils and introducing a compulsory matriculation test involving Science and Technology for high school pupils.

A final caveat should be mentioned in concluding this survey of historic environmental education trends in Israel. The picture presented is not fully comprehensive, but describes a narrative that reflects the mainstream experience among communities that are part of the Jewish Zionist movement. Essential voices of two other groups, each approximately 20% of Israel's population, are often missing from the analysis. The narratives of Israeli Arabs and Ultra-orthodox Jews regarding environmentalism and environmental education should be better articulated in order to make this story complete. Telling one cohesive story that respectfully allows all narratives to be voiced⁷⁷ is complex task, which yet needs to be tackled. Nevertheless integrating these communities holds advantages for Israeli society that will be significant in pursuing a sustainable and prosperous future.

After twenty years of intensive efforts, Israel today offers an increasingly rich menu of alternatives for public school pupils, even as it falls far short of its pedagogical potential and the country's growing ecological needs. Looking back, present disappointments are not a function of

inadequate commitment or incompetence among professional personnel at Israel's MoE. Rather what emerges is a systematic misunderstanding of the importance of environmental and sustainable education by the top political management levels at the Ministry. As long as Israel's educational goals remain centered on security, economics, and industrial needs, without internalizing the significance of environment quality as a critical priority, a healthy, prosperous, and sustainable future is compromised.

Pursuant to innumerable recommendations over the years, it is time to truly make environmental education a compulsory subject for every Israeli pupil, from pre-elementary through secondary education. This requires a sustained effort. Just as 1994 was declared a national year of "Environmental Quality", the school year of 2009 was declared to be "Green Year" in Israel's educational system. New supporting materials for school staff were available on the Internet sites of the MoE and the Ministry of Environmental Protection.⁷⁸ Not surprisingly, it appears that this year had little effect on environmental literacy among Israel's school children and did little to upgrade environmental education in Israel's schools significantly. For this, a more serious ongoing commitment by Israel's educational authorities will be necessary. Preserving the environment cannot be a "flavor of the month", but must be a core theme in public school experience of all Israeli children.

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