



Research Article

The failure of gifted education in Israel

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Abstract

Israel has offered free identification for giftedness test for all its students for decades. Since the early 70ies the financial burden caused by the programs for gifted students is substantial, but the results are very poor. In this article it is to be shown that neither the quantity nor the quality of programs offered to the gifted by the Ministry of Education justify their aspirations. In the last 30 years the achievements I all international examinations are low, and lately even deteriorated. Even students identified as gifted do not achieve as the top 5% of the world record students in international examinations. In addition, Israeli youths have won a low rate of international prizes. Many parents ae already aware of this situation, thus when their children are invited to participate in a gifted class choose to decline this opportunity. Israel has the highest rate of inequality in education among all developed countries. The fact that dozens of centers for enrichment gifted students are located in the periphery had not changed this situation. Quite often the Israel ministry of education sets new rules that prevent many high ability students from materializing their potential, for example, preventing high ability students from taking the matriculation examinations at an early age. In order to improve this situation research needs to be available, but research about gifted education hardly exists in Israel. There is lack of reliable research about the advantages of gifted classes in the long run. The best scientific, financial, and innovative Israeli achievements have been developed outside the education system. Computer science is the only subject learnt in school that keeps the economy of Israel ongoing, and has done so even during the covid-19 pandemic, but Israel has been developed as a high tech nation in spite of its education system rather than with its assistance.

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Introduction: The state of the art

Israel started its special education for the gifted in 1973 (David, 2017). For almost half a century substantial public money has been invested in it since then. Unlike in almost all other countries, where raising a gifted child puts a financial burden to an family's budget from the identification process throughout private education needed in order to fulfil the needs of the gifted, the identification for giftedness in Israel includes all its 2nd- 3rd graders.² The only exception are students learning in institutes that object to both the process of identification of giftedness and to their students' participation in the gifted program offered. These institutes include Ultra-Orthodox schools (see David, 2013a), private, Christian schools (David, 2014a, b). In some democratic and anthroposophical school, which are private, secular institutes, there

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² Until the second decade of the 21st century most Arab children were identified for giftedness in grade 3 and thus the Arabic special programs for the gifted started in grade 4, while most Jewish ones started a year earlier. In the year 2021 the division between children who are identified for giftedness in grade 2 and those in grade 3 has been done according to their geographical region: only children living in the northern part of Israel – where the majority of the population is Arabic but Jews consist of remarkable minority – has been identified in grade 3.

is no public policy "against" identification for giftedness, but rather lack of information given to the parents regarding this test, taken usually during the month of October of grade 2, and as a written consent from the parents is needed in most cases the schools inform the Ministry of Education that there are no candidates for the test. The Ministry of education has founded a special department for gifted and outstanding students; the only one in the whole world (Freeman, 2010). This article will show that the enormous investment of money and manpower is far from properly serving the well-being of the gifted in Israel.

Neither the quantity nor the quality of programs offered to the gifted by the Ministry of Education justify their aspirations

The so-called advantages of the investment in gifted education in Israel has already been questioned by bloggers (e.g. David, 2013c; Dracup, 2012a, b, c); journalists (e.g. Gross, 2018; Levi, 2009; Peled, 2015); parents (e.g. Daniela, 2011; Kessler, 2018); educators (e.g. Vidergor, 2010), and researchers (e.g. David, 2013d).

The failure of gifted education

Low achievements in the international examinations

According to the following international criteria, gifted education in Israel has failed. First – the achievements of Israeli children in the international examinations have been low in comparison to all other first world countries, and have been deteriorating gradually since 1963.

Comparatively low achievements of the best Israel students: Israeli students identified as gifted do not achieve as the top 5% of the world record students in international examinations

It should have been expected that in the PISA and TIMSS examinations at least 5% of Israeli students, those identified by the Israeli ministry as gifted or excelling (Excelling students – definition and characteristics, 2021), will achieve, in average, as highly as those of percentile 95 in the international examinations. This has not been the situation in the last 20 years.

- In 1999, percentile 95 students in Israel had the lowest mathematics achievements among percentile 95 students in ALL developed countries. Among the countries participating in the Third International Mathematics and Science Study at the Eighth Grade only Turkey, Jordan, Macedonia, Chile, the Philippines, Morocco and South Africa the top students scored lower than in Israel (Mullis et al., 2000, Table D.1). Only 5% of Israeli students scored at percentile 90 in this examination (ibid, exhibit 1.6).
- In 2006 Israel cored third among all 57 examined countries in within-school variance in the PISA examinations (OECD, 2007, Figure 5). Unlike in the two other countries with a similar level of inequity, where such inequity was accompanied with high a substantial amount of high achieving students - in New Zealand 4.0% and in the US 1.5% reached level 6 in science, only 0.8% of the Israeli students reached this level (ibid, table 1). That means that the reservoir of excellent students, many of which must have been gifted, is just about one fifth of that in New Zealand, half of that of the US, and practically smaller than in all developed – as well as many developing countries (ibid).
- In the TIMSS 2007 only 4% of grade 8 Israeli students reached the advanced benchmark – 625 points – in mathematics. All other European and non-European countries had higher rates of students at this level (Mullis et al., 2008, Exhibit 2.2). In that year the Israeli "sample" included less than the 90% minimal requirement, and thus it should have been assumed that the actual situation had been much worse, as the "weak" schools had been excluded by the headmasters refusing to participate (ibid, Appendix A).
- In PISA-2009 the percentile 90 Israeli students scored in reading less than the OECD average (OECD, 2010b, table 1.2.1.9 Part 1/1]: Mean score, variation and gender differences in student performance on the reading subscale non-continuous texts). In mathematics the results had been much worse: percentile 95 Israeli students scored just 615, 31 points below the OECD percentile 95 student, and exactly as the percentile 90 OECD

student! (ibid, table 1.3.3. part 1/1: Mean score, variation and gender differences in student performance on the mathematics scale). But the worst results were in science: percentile 90 Israeli student scored 590, in comparison to the 625 of the percentile 90 OECD student; percentile 95 student, who was expected to show at least "excellent" results, being identified as "gifted" or "excellent" by the ministry of education, scored 623, less than percentile 90 OECD student, and 34 points less than the percentile 95 OECD one! (ibid, table 1.3.6: Mean score, variation and gender differences in student performance on the science scale).

According to OECD (2019),

- [...] over 25% of students, or more than 1 in 4 students, in 10 OECD countries – Chile, Colombia, Greece, Hungary, Iceland, Israel, Luxembourg, Mexico, the Slovak Republic and Turkey – performed below Level 2. (Figure I.5.1) (ibid, p. 92).
- In PISA 2018 the coverage of Israeli students had been compromised by two main reasons, the non-inclusion of ALL Ultra-Orthodox boys as most Ultra-Orthodox girls, as well as many Arabs (David, 2021b). Ultra-Orthodox Jews consist of about 15% of Israeli population and about half of it are under 16 (Statistical Report of Ultraorthodox (Haredi) society in Israel, 2017). In addition, more than 15% of Arabs living in Israel were not included in the sample; the East Jerusalem students, where the population is over 300,000 in comparison to ~2,000,000 Arabs who are Israeli citizens. According to OECD (2019), the coverage of Israeli students was almost the poorest among all participants: over 10%). In all OECD publications of the last 50 years there is a note stating that: "The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law". So it can be concluded that in spite of the fact that at least 25% of Israel's weakest students did not participate, it still scored at the bottom of OECD countries regarding students whose achievements that were not good-enough for building the future of the country academically, financially or industrially.
- While the average of the top performing among PISA 2018 participants – in at least one subject (levels 5 and 6) – was 15.7%, the Israeli one was just 15.2%. The average Share of low achievers in all three subjects was 13.4%, 22.1% of Israeli students did not reach level 2 in all three subjects (ibid, Table I.1 [1/2:] Snapshot of performance in reading, mathematics and science). Only 2% of Israeli students scored at level 6 in reading (ibid, Table I.B1.1 [1/2] Percentage of students at each proficiency level in reading). In mathematics the picture was not any better: only 1.8% of Israeli students reached Level 6 (above 669.30 score points) in comparison to the 2.4% OECD average (ibid, Table I.B1.2 [1/2] Percentage of students at each proficiency level in mathematics). The worst result was in **science**: only 0.7% reached level 6 (ibid, Table I.B1.3 [1/2] Percentage of students at each proficiency level in science).

In summa: it should have been expected that a country with such a developed system for educating the gifted would be able to help them reach at least as any average OECD country. This did not happen in any of the 4 subjects examined in any of the international examinations in the 21st century.

Israeli youths have won a low rate of international prizes

As gifted education started in Israel almost 50 years ago, it should have been expected that the rate of international prizes of Israeli students would be increasing as more and more Israeli children are identified as gifted and get gifted education. Unfortunately, this has not been the case. Gifted children are the "natural" candidates for obtaining international prizes, especially in a nation with a long tradition of excellence and nurturing talent (e.g. David & Wu, 2008). Let us see the situation in the Mathematics Olympiads from this aspect.³

³ This part of the work is partially based on David (2013b).

Israel had started participating in the *International Mathematical Olympiad* in 1979. During the 80s it scored from 14 to 26; during the 90s – from 13 to 26; in 2000 – it scored 11th, but since then the deterioration was observed annually, until in 2010 it scored 53th. Furthermore: the team of 2010 included only 5 youngsters; there were not even the minimal 6 talented youngsters who were good enough to be sent to the Olympiad (IMO, 2020). In addition, between the years 1992, just after the immigration to Israel from the ex-USSR was at its peak, until 2007, when even the youngest children of the immigrating Russian Jews were on the verge of adulthood, more than 53% of the participants in the IMO were either immigrant children or Israeli-born children of ex-USSR immigrants (ibid).³ This is an extremely high rate, as the percentage of Russian immigrant Jews reached just about 20% of the population after 20 years of immigration, while their average birth rate was about half than the Israelis, ~1.5 and 2.88 respectively (Statistics, Israel, 1995, tables 3.12 and 3.14) Thus, in spite of the intensive contribution of high quality IMO participants Israel had been able to keep its previous high math level, but finally lost its former advantage and placed itself among third-world countries.

A dramatic change has occurred in 2011: Israel reached the 23rd place (IMO, 2020). This change had nothing to do with the ministry of education or with any gifted program; it had ALL to do with Mr. Lev Radzilowski who started coaching the Israel team and had been doing it successfully since (The coaches of the Israeli mathematics team, 2021). Israel has not recovered its standing from the 70ies, 80ies or early 90ies, when the new immigrants from the ex-USSR countries won Israel medal sequentially, but is certainly doing much better. The main contributors to these better results are by no means the ministry of education, but rather individuals who dedicate their lives for the advancement of the gifted, not necessarily those identified by the ministry of education. In addition to Lev Radzilowski his father, dr. Vladimir Radzilowski, is one of these individuals, teaching high level mathematics to children from age 5 on, pushing them onto materializing their potential, trying to make them participate in the Beno Arbel program at the Tel Aviv University, and persuading them to do their best in order to "win against Iran in brain power". And indeed, in the second decade of the 21st century the gap between Iran in the International Mathematics Olympiad and Israel has substantially decreased...

Many parents whose children are invited to participate in a gifted class choose to decline this opportunity

In 1973, when public diagnosis for the gifted started in Israel, it was the initiative of parents of gifted children, who were special education that was to supply an answer to their children's needs. In December 1973 grade 4,5, and 6 special gifted classes were opened at the Tel Aviv Graetz school, as 3 such classes in Haifa, at the Leo Baeck school. The objection of the city, supported by Jerusalem parents led to the opening of a weekly enrichment program for the program rather than special classes (David, 1997, 1998).

But this situation, of a very small number of gifted classes has not substantially changes in the last half century. As to the 2020/21 school year, there are only 7 Israeli schools with gifted classes. In 2014 22 children identified as gifted were invited to participate in the 3rd grade gifted class that was to open in September 2014 at the Rokach school in south Tel Aviv. As most of these children were living in north- and the center of Tel Aviv, only 6 children – those who were from south Tel Aviv registered and the class did not open (Kashti, 2014). Furthermore, the situation in high school regarding classes opening in the periphery is not any better. As Dattel (3/9/2018) published, in 2018 almost all gifted junior- and senior high school classes for the gifted were in the center and south of Israel. The situation has not changed since.

There is a huge demand for enrichment programs, with 56 centers for such programs functioning both in the morning – for children identified as "gifted" and in the afternoon – for those who get the "excelling" label. But as "Vox populi, vox Dei" we can conclude that due to many problems in these classes, from lack of appropriate teachers, to lack of professional expert counselors, no special programs that would suit man of the students and the high percentage of children with disabilities and emotional/behavioral problems learning in these special classes, many parents whose children have been chosen to learn there, decline that offer.

In addition to the high rate of declining the offer (David, 1997, 1998, 2014c), there is a high dropout rate in these classes. No statistics is available, the reason for it can be but speculated.

The department of gifted and excelling students at the Ministry of Education as an obstruction to the development of the gifted

In the last two decades the department of gifted and excelling students has been obstructing, even blocking the academic advancement of many gifted children. The main target of this department have been homeschooled gifted who had been prohibited from taking the identification for giftedness tests offered to all grade 2 or 3 Israeli children (David, 2020a; Special programs for the gifted, 2019), participating in the programs offered to those who have been successful in these test (ibid), and participating in many university programs for the high school gifted (David, 2020a; Trabelsi-Hadad, 8/1/2020). According to Trabelsi-Hadad (2020), in spite of their being considered "the future brains of Israel", some of them get a university degree while still in their teens, the ministry of education ordered the universities not to accept homeschooled students to the special university programs. Even the rage of the university rectors, who defined these students as "the spearhead of the scientific research in the coming years" the ministry of education requires that they "first join the public education system".

Homeschooled children and youths are not allowed to participate in the Future scientists center (2021) program, in the Alpha (2021), Odyssey (2021), or Idea (2021) programs.

The only academic program open for homeschooled students is taking courses at the Open University. Wininger (2014) mentions this possibility as an option opened for gifted students (ibid, p. 7), but in fact this is the only option opened for homeschooled students who have not been identified as gifted because of being homeschooled; the Open University is the only academic institute that does not require the "gifted label" as an entrance condition.

Double discrimination against gifted from the periphery

For many decades, students who learnt at least 2 years during elementary school in a special gifted class, did not have to take any "entrance examinations" for a high school gifted class. This policy has recently changed, and starting from the year 2022 ALL candidates for a gifted junior class will have to take the Karni institute entrance examinations (Acceptance conditions to the special high school gifted classes, 2021). But until it changes, children who do not live in the center of Israel, the only area that until now has elementary school gifted classes, even when identified as gifted in grade 2 or 3 were quite often denied acceptance to high school gifted class either due to their "failure" in the new "giftedness exams" or because there was no vacancy for them, as the other students, who did not have to take any test, were automatically accepted to the high school gifted track.

In addition, in 2013 the ministry of education has changed the identification criteria for giftedness claiming that the old system, namely, that for each of the 50+ gifted centers and the few special elementary school classes the local top 1-3% percent of the age group were chosen. In the new system the criteria became national rather than local, and thus, in just four years, the number of Tel Aviv students who were identified as gifted increased by 250%; in Haifa by 200%, but in the periphery it decreased sharply (Trabelsi-Hadad, 2017). By this decision the Ministry of education, who has declared time and again about "closing the educational gaps among Israeli sub-populations" (e.g. Glanz, 2016; The program for reducing gaps and advancing equity in the education system, 2015). While the ministry of education invests huge amount of money in so-called "closing educational gaps" programs, programs that all seemed unsuccessful (e.g. Ayalon, Bllas, Shavit, & Feniger, 2019), the gifted in the periphery, suffering already from difficulties in access to practically ALL high level educational resources as well as financial problems, experience a continuing discrimination that reduces their prospects to materialize their abilities.

Homeschooled children cannot participate either in the identification for giftedness process free to all 2nd or 3rd grade Israel students, in the special enrichment programs taken place in over 50 centers in Israel, or in the elementary – or high-school special gifted classes

One of the most common solution families of gifted children chose in order to fulfil the academic needs of their children is homeschooling (e.g.). In Israel there is hardly any literature about gifted children who are homeschooled. Searching "gifted" in MASA – the web of Mofet institute (2021) – A Center for the Research, Curriculum and Program

Development in Teacher Education, Reveals but 32 items. *Only one of these items is about gifted homeschooled students* (Ray, 2014), which is actually a review of Murphy's book (2012).

In the first two decades of the 21st century homeschooling of the gifted has become a more central issue both in Israel (e.g. Dattel, 30/8/18) and abroad. But while all over the world the increasing number of children involved in homeschooling has resulting in a huge addition of literature dealing with this subject, as well as an increase in the number of works about homeschooling of the gifted (e.g. Conejeros-Solar, & Smith, 2018, 2021; Goodowens, & Cannaday, 2018; Goodwin, & Gustavson, 2009, 2015; Kearney, 1992; Kula, 2018; Morse, 2001; Murphy, 2012; Ray, 2014). But in spite of the fact that "[...] more than one-fifth of homeschool parents surveyed pointed to their child's "special needs" as a reason for homeschooling" and a substantial number of these families "[...] choose to homeschool because of their child's advanced academic abilities" (Kunzman, & Gaither, 2013, p. 12), Kunzman & Gaither (ibid), who cite Kunzman (2007) and Winstanley (2009) stated that: "While there exists a growing body of advocacy literature and anecdotal accounts of homeschooling gifted children, virtually no empirical research is available" (Kunzman, Gaither, 2013, p. 12)

Preventing high ability students from taking the matriculation examinations at an early age

The Ministry of Education has tried its best to prevent from young talented high school students to take the matriculation examinations, which are a must for full enrollment in higher education, earlier than their peers. This situation has been going on for decades, when each new minister sets new orders, and each time they are challenged by parents. Here are some examples.

On 15 June 2005, during the 258th sitting of the 16th Knesset – the Israeli parliament, the Parliament Member Ms. Mali Polishuk-Bloch presented the Minister of Education, Culture and Sport with the following parliamentary question: Why does the Ministry of education not allow school-students who are under 16 to take the matriculation examinations in subjects they are learning with students in higher grades? Neither the Minister nor her [Limor Livnat] deputy, but her deputy sent a written message according to which: "opening such an opportunity will result in pressure to be examined earlier, and thus the cancellation of the "school-grade" concept⁴ enhancing the necessity of private tutors rather than making use of school teachers, inability to give a final grade in the annual report." (ibid). In addition, the deputy minister stated that when students are examined at an early age they have higher prospects to fail.

Ifargan (2014) reported that a 13-year old excelling in English from Tel Sheva (or Tel as-Sabi, تل السبع) the Bedouin town in the Southern District of Israel, bordering the city of Beersheba, was recommended by both his teachers and head the school headmistress to take the English matriculation examination, The Ministry refused because of his young age. In 2014 the Ministry policy was "allowing" excelling students to take the computers science, mathematics, physics and chemistry matriculation exams in grade 10 and in English only in grade 11.

Ifargan (ibid) also states that parents of 650 excelling students had "recently" served [submitted?] **a petition** to the High Court of Justice against the Ministry of Education and its Minister, Rabbi Shai Piron, demanding to allow their grade 9 children to take the high-level 5-point mathematics matriculation examinations. The petition, served by 23 parents representing of the 650 participating in the Bar Ilan program (Blumenfeld, 2014),

In an interview with Dr. Daoud Bshouty, the first Arab Technion Professor, an expert of complex analysis and mathematical statistics, taken place before the publication of the book "the gifted Arab child in Israel" (David, 2014b), Dr. Bshouty told me that he had no matriculation certificate. Skipping two grades, he was done with high school at age 16, after taking all matriculation examinations at the **Orthodox School** in Haifa belonging to the Greek Orthodox Church, a high prestige school considered one the best in Israel (e.g. Ratner, 2004). In 2019 it scored the first in the whole country, with 100% success rate in the entitlement to the matriculation certificate, 42% rate of excelling students, 100% of the students took the high level matriculation examination in English, and the passing rate of high level matriculation examination in civics, history and Hebrew [mandatory language in all Arab schools] had been 100%

⁴ Ignoring the fact that in the US the opening of opportunities to learn in a variety of levels during high school grades had no such consequences...

(Nishlis, 2019). In 2019 this school elegantly passed the Jewish ones considered the best in the Jewish sector, among them – the Leo Baeck school, which has a gifted track starting from grade 7. In 2017 the Orthodox school the Orthodox school had the highest matriculation achievements in Haifa as well, far better than those of the Leo Baeck school (Yaron, 2017).

After failing in the Arabic matriculation examination the 16-year old Daoud Bshouty won [received?] a conditional admission to the Technion, namely, he could participate in any course he wished but was told he had to pass the Arabic matriculation examination within a year. He did not. 3 years more passed and he did not get a "passing" grade in Arabic, and thus was not entitled to the BSc he won with honors. When speaking about it with his catholic Abe the pastor had "a talk" with the dean of the mathematics faculty who had exempted Bshouty from the Arabic test so he could receive his degree, go on with his studies and started climbing in the academic ladder until reaching its top.

The fact that at each year well over 1000 high school students learn in a variety of mathematics programs while no mathematics track exists in any of the gifted programs offered by the Ministry of Education (David, 2019), is a symptom of the failure of gifted education in Israel.

Lack of reliable research about the advantages of gifted classes in the long run

As there is no quantitative research about the graduates of all gifted programs in Israel since these classes first opened in 1974, measuring the "success" or failure" of these programs by "neutral" criteria, such as academic achievements, health, or mental wellbeing, as has been done for almost a century with the Termites (e.g. Hastorf, 1997; Jolly, 2008; Zuo & Cramond, 2001), is impossible. However, here are some testimonies of graduates of gifted programs as to their feeling towards their experience of being identified as gifted by the Israeli Ministry of Education and participating in a gifted classroom.

One such testimony is hereby given by graduates of a "MOFET" Ashdod program for excellent students in math and science (Amiel-Lavie, 2018). Here is a short description of the MOFET program:

The MOFET program has been recognized by the department of education as an acceleration school-program, and as such outstanding participating students are allowed to take the highest 5-point level matriculation math examinations in the middle of the 11th grade instead of at the end of grade 12. Mathematics teachers of the MOFET program take part in a summer continuing education program which includes advanced math problems and preparing students to the math Olympiad, and subjects related to didactics of mathematics. (David, 2019, p. 66).

According to Amiel-Lavie (2018), eight years after high school graduation most of the graduates did not choose a technological track they were trained for, some did not choose any academic educational track, and almost all of them [recall?] remember their high school experience as "difficult". Being accepted to this class was highly selective: only students that graduated from elementary school with honors were interviewed, and only some of those interviewed were invited to participate during the summer holiday in a preparatory intensive program where they studied high level physics, English and mathematics. Those accepted had a very heavy learning load; as a result, one third of the students dropped out during the 6-year track. The rate of students taking the highest 5-point math matriculation examination was 32%, double of the rate in the general population, but the price was very high. Focusing on math-science subjects designed a false ideal according to which the only way to professional success is high level math and science, and thus – that humanistic and social subjects are a compromise made for the less talented. But in spite of this brainwashing only 6 students of the 30 who started the track [and the 20 who finished it] chose an engineering-scientific track.

This article (ibid) criticized the reform that the ministry of education had announced, namely, the focusing on learning high level math as a national strategic target, aimed to improve Israeli military, technological and economic strength. The graduates who had been interviewed complained about narrowing their horizons by directing all of them – without taking into consideration their preferences – to technology and science. One of the graduates even defined

herself as "a machine, that nobody asked whether she liked what she studied or missed many of the humanistic subjects that caused her current lack of knowledge".

According to Gruber (2017),

One might assume that Israel's low scores can be attributed solely to the weaker segments of society, and that the People of the Book's higher-achieving pupils measure up to their counterparts elsewhere in the world. But that would be incorrect (p. 3).

Had the huge system of gifted education indeed worked, it would have been expected that even if the gaps among sub-populations had not been decreased (see, for example, David, 2020b), the highest achieving students, those identified as gifted and excellent by the ministry of education and receive special education for the gifted financed mostly by the government would have done at least as well as the OECD average. But this is not the case:

there is no evidence of a narrowing of the gap. In fact, the gap widens. For example, the difference in scores between the 91st percentile of Israel's Hebrew-language test-takers and the 91st percentile of all countries is 13 points while in the top percentile, there is a 39 point gap. The disparity between Israel's Arabic education system and the average for all countries also widens in the highest percentiles, from a difference of 126 points in the 91st percentile to one of 139 points in the top percentile (ibid, p. 4).

Namely, even those who have been identified as gifted in Israel scored 39 point less than the average OECD student. Furthermore.

Math enrichment activity, which generally entails substantial costs in terms of money and/or time, attests to the importance that pupils and their parents actually attach to the acquisition of math skills (ibid, p. 11).

Israel scores near the top of the number of weekly math enrichment hours reported by pupils in the various countries (ibid). Extra-curricular mathematics classes are offered to the Israeli students in a variety of places, levels, grade-classes, tracks, and paces (see, for example, David, 2019). Parents' education cannot be blamed either for the failure of gifted education, as Israeli mothers are more educated and have a higher awareness of the importance of mathematics learning than almost every other country (Gruber, 2017).

The failure of gifted education elsewhere

The failure of gifted education is not unique to Israel (see, for example, Bui, Craig, & Imberman, 2014; Callahan, Moon, & Oh, 2014, 2017; Plucker, & Callahan, 2014). The failure is due to several reasons, some are similar to those of Israel but some stem from different systems, different allocation of budgets, and cultural differences.

According to Jolly and Matthews (2018a), one of the main reasons for the emerging reason for home education in the United States is the inability of the school system to cater for children with special needs, including the gifted.

Jolly & Matthews (2017) presents a qualitative work of 4 mothers who chose homeschooling for their gifted children. Each of these mothers expressed in her blog her experiences and perceptions as the main educator in charge. Slater, Burton, & McKillop (2020) came to the conclusion that about 20% of homeschoolers in Australia are gifted children whose needs were not answered by the system.

Gertel (2019), who had written a recent report on the state of the art of homeschooling in Israel, presents the subject of Israeli homeschooled gifted in a 4-line paragraph (p. 34). That paragraph is a concise summary of the Jolly, Matthews, & Nester (2013) article, which itself is but a qualitative study done by interviewing 13 families who had chosen homeschooling after multiple unsuccessful trials to get a proper answer to their gifted children in the American public education system.

Israeli high technology: Israel best scientific, financial, and innovative achievement has been developed outside the education system

Israel has been known in the world for its highly developed high technology, has been named "the second Silicon Valley" (Today's High Tech Scene in Israel, 2010), and has an extraordinarily high rate of successful start-up companies (Devi, 2007). Bill Gates had referred to Israel explicitly as: "part of the Silicon Valley" (Plocker, 2005).

Arieli (2017) reports that "[...] it [Israel] has the highest density of startups per capita in the world and is ranked No. 2 in innovation, according to the World Economic Forum's competitiveness report". Citing Andreas Schleicher, Director for Education and Skills and Special Advisor on Education Policy to the Secretary-General at the OECD, when asked how come Israel has such high achievements in high technology while such low ones in the international examinations, the answer given is:

You don't have more talent than other countries, but I checked it out thoroughly and I think that your secret is that you know how to take advantage of talent better than others," he answered thoughtfully.

There is a gap between what is necessary to excel in standardized testing and what is required to succeed as an entrepreneur and innovator.

PISA evaluates students based on their ability to provide specific answers on a standardized test. Neither the Israeli education system nor the Israeli culture is good at teaching children to do this.

This *shortcoming* appears to motivate children to become innovators and entrepreneurs. (ibid)

Unlike the old belief – which is still held by many – that Jews are "the chosen people" and this explains their exceptional achievement in computer's science, the cyber world and high tech in general, or that our education system has contributed to these achievements, Schleicher, the European well know expert says it in so many words: Israel is successful in the only area that the education system has not, is not and probably will not contribute to. In an area where many a time students know more than their teachers, and where many students, still in their teens and sometimes their early teens make much more money than their parents, let alone their underpaid teachers...

Adi Shaharbani, who co-founded Skycure, the cyber security company in 2012 and sold it 5 years later for over 250 Million dollars (Hatony, 2017), of which each of the 2 co-founders got 28 million (Tzipor, 2017), explains this seemingly-contradiction (Arieli, 2017):

Being open to new ideas is a great start, but children must be taught how to come up with new ideas by leveraging their knowledge, and then how to push these ideas forward. Unfortunately, these skills are not generally taught in public schools. Luckily, Israel is highly accommodating of informal educational programs with novel approaches.

Adi Sharabani, founder and CEO of Skycure, an army reservist and one of the programs' instructors, explains the advantage of his program, based on Gvachim (2021) and Magshimim (Accomplish) over any program – including those intended for the gifted, in supporting junior- and high school students – living all over the country – boys as well as girls – in becoming innovators (ibid):

These extracurricular programs facilitate computer science and cyber learning for gifted children ages 12 to 18. They were initially founded to better prepare Israeli youth for the intelligence units of the Israel Defense Forces, but today these programs are partly responsible for educating Israel's skilled high-tech workforce (ibid). [...]

"What we do in these programs is we take a child's ability and we make him or her run with it. The purpose, therefore, is not to teach the kids a certain skill in the sense of how-to. The purpose is the vector, the movement, the progress itself, as opposed to the final goal."

And indeed, the four goals of Magshimim as explained in their web, are: [acquiring] large knowledge in varied technological areas, [getting] tools for self-learning and team work, [having] an opportunity to be considered to some of

the most prestigious IDF units, and [being] exposed to the leading high-tech companies. As in the last 50 years the Israeli army – rather than education system – has been the engine of computer science leaning, computer-related industrial developments, and computer-related intelligence directed, regarding preparing, teaching, and directing manpower to a variety of tasks, and building weapons, anti-weapon-means and surveillance or tracking devices, these 4 aims are highly rewarded "prizes" for many young Israelis, especially from the periphery and from low socio-economic background, Unfortunately most graduates of the relevant army units, those who have contributed to the status of Israel as a "start-up nation", are from middle-upper class, who live in the periphery, and thus get better out-of-school education, as well as better school education in relevant areas – particularly math, physics and English, and programs such as Magshimis help but to part of them.

Sharabani says their secret lies in making the children get "stuck."

"We want to figure out how to teach a child to take a skill that he has acquired and apply it to something completely different, how to transfer it to a new area. And the way to do that is by bringing him to a place where he is stuck, where he does not know the answer and no one will give it to him... Therefore, true growth, true teaching, comes from that place of not knowing the solution and having to come up with one anyway. (Arieli, 2017)"

This approach goes beyond cyber or coding. It is applicable to all aspects of life. It's about putting oneself in a position where finding a solution is challenging and thought-provoking. The core of the program's success and popularity is based on the idea that true learning comes when one seeks knowledge for oneself.

As a graduated of the Israeli system who was blessed with both the opportunity to get good, solid higher education in a high level university rather than in one the second-rate Israeli colleges, where most students are from the periphery and/or minorities, and serving in an elite IDF unit that trains its soldiers properly and help them be connected to the main figures in computer industry in Israel, Sharhabani expresses his experience in the education system to which he contributed for over a decade, as such:

"At first, when we started training schoolteachers, it looked like it was going to be a complete flop for the simple reason that the teachers did not have enough experience and expertise in the field.

"But what happened next was fascinating. It created scenarios whereby teachers looked a kid in the eye and said honestly, 'I don't know.' This suddenly brings us to a place where teachers and students are actually in dialogue; they are brainstorming. One does not simply feed data to the other. Rather, they both grow together, and they reach places no one has been to. The teacher, in this approach, is not a funnel of facts, but a conveyor of methodology."

Looking at the histories of most of the main characters that had contributed to the special standing of Israel as the "high-tech nation" reveals an interesting though somewhat bothering picture: the IDF has successfully replaced the education system in educating and producing programmers, computers' engineers. And entrepreneur. Any list of "high-tech individuals" in Israel will prove it. For example: in the list of the 61 "reasons for pride: the greatest successes, unforgettable turning points, and standing-out monuments in the Israeli high-tech industry" published in the 61st Israeli independence day (Nes et al., 2009), many of the individuals listed had started their way in one of the IDF computers' units; the same as many of the managers, CEO's and entrepreneurs of start-ups and high-tech companies. Another recent list is in High-tech's Israeli military connection (19.1.2019). where three of the main characters in cyber security, explain these connections. Yoni Heilbronn, chief marketing officer at Tel Aviv-based Argus Cyber Security, said: "The entrepreneurial spirit came from there," referring to his company's roots in the IDF cyber unit. Zohar Fox, CEO at Aurora Labs, said he made lifelong connections in the IDF. "You serve three, or five, or seven or eight years, however long, and it becomes family, basically," and Dan Sahar, vice president of product development for the Israeli automotive

cybersecurity firm Upstream Security, is a former IDF major. He said that more than most military organizations, the IDF had a lot of improvisation and on-the-job high-tech training.

The path for advancement had, right from the beginning, open for women as well (see the interview with Ms. Ruth Alon, the president of NetVision: Zorman & David, 2000). In the 21st century the rate of Israeli females who climbed at the top of the "high-tech" ladder through their military service has been increasing substantially. For example: Michal Braverman-Blumenstyk, CEO of Microsoft Israel R&D Center, who had served in the Israeli Air Force Electronic Warfare, or Yael Wiesel, who "accumulated her topographic knowledge in the Israeli Air force" and turned it into Walmart exist (Dor, 2021).

In summa:

The fact that almost all Israeli children have access to gifted education has not contributed to close the inequity in computer-related professions, which are the best paid, that for decades have kept Israel from a deterioration of its financial standing in spite of its low education level, and the high level of unemployment – the rate of unemployment among Ultra-Orthodox men was 49.5% in 2019 (Waksman, 2019), that of Arab women – well over 60% (ibid)

But Israel excels not only in military-dependent or related high-tech. 39 of the 100 best companies for workers in 2020 were high technology companies (Klingbail, 2020). This did not include other companies that had a substantial number of high tech workers, such as finances and banks [15 more companies] and industry that employs high tech professional [17 more] (ibid). Even the covid-19 pandemic did not stop the development of the Israeli high-tech: actually it had given it a massive boost (e.g. Sonnefeld, 2021).

In summa:

It can thus be concluded that the only scientific subject-matter learnt in school that does not give any advantage to its students – computer's sciences – is also the only subject that keeps the economy of Israel ongoing, and has done so even during the covid-19 pandemic.

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