

Achievements in Israel's Education System: An Overview

Nachum Blass

It's also true that some story lines, and the facts that fit them, become so commonplace that they are hard to dislodge by counter facts. Whenever I write a public essay claiming that our schools are not in a state of historic decline, fact-checkers call to ask for citations. They do not ask the same of those who claim the opposite. This is the way of all media... (Meier, 2009)

Introduction

In an article written more than a decade ago (Blass, 2011), the question was asked whether there is any truth to the claim that the education system in Israel is rapidly deteriorating. Based on the data, we showed that there is no decline taking place, and we suggested looking at the situation from a slightly different perspective. While it can certainly be said that the education system does not meet expectations, in light of the economic, social, and political situation, the very fact that its achievements are not on a downward trend is reason enough for praise.

More than a decade has passed since then and it would appear that there is nothing new under the sun. Most of the public in Israel tends to have a negative opinion of the education system and they express long-term dissatisfaction with its achievements and functioning. The main reasons for this are as follows:

* Nachum Blass, Principal Researcher and Chair, Education Policy Program, Taub Center for Social Policy Studies in Israel. The author wishes to thank Laura Schreiber for her assistance in preparing the graphs and the readers of the early drafts for their helpful comments.

1. The achievements of Israeli students on international tests continue to be lower than in countries to which Israel compares itself. Considering that more than 20% of the children in any cohort are not tested (most of the students in Haredi (ultra-Orthodox) schools, students attending schools in East Jerusalem, and students in special education), and some of these students are academically weak, the natural conclusion is that academic achievement is even lower than it appears to be.
2. The disparities in academic achievement between students according to socioeconomic status are among the largest in the Western world. The achievements of students from weak socioeconomic backgrounds are very low, and those of students from strong socioeconomic backgrounds are low relative to their counterparts in other countries.
3. The exam scores among those studying to become teachers are low relative to other professions that require an academic education, and, what is more, low salaries of teachers make the profession unattractive.
4. Many students and teachers encounter a reality of violence in the schools.

The list goes on and there is no doubt that the heads of the education system should be investing efforts in solving these problems. However, is it correct to say that the education system has been on a downward trend during the past decade? Or in other words, is the situation of the education system worse than it was a decade ago? Are these widely held opinions justified? In what follows, we will see that just as the assessment that the system was on a downward trend between 2000 and 2010 was unjustified (Blass, 2011), so, too, is the current assessment that it has continued on its downward trend.

It is human nature to believe that the past was somehow better than the present, but memory tends to be selective and is often misleading. There are those who feel that an apocalyptic description of the system is necessary in order to shake up the public and to achieve willingness on the part of the government to allocate the necessary resources to improve the system. However, it may be that the reality is just the opposite and that such an error serves those who believe that any additional investment in the education system is a waste of resources.

The following chapter surveys some widely used indices to determine whether the situation of the education system has worsened or improved. First is a discussion of the budget and then the academic achievements of

Israel's students. Following that is an examination of several aspects of the system's manpower and then a look at school environment. The final section is devoted to a summary and conclusions. The discussion will relate to both the student population as a whole and the Jewish and Arab sectors separately, and in some cases it will differentiate between schools according to the School Nurture Index.¹

The discussion is based on data from the Central Bureau of Statistics (CBS), the Ministry of Education, and the National Authority for Measurement and Evaluation (RAMA), unless a different source is noted. We have full faith in the objectivity, level of professionalism, and quality of work of these agencies. Their data is gathered on an ongoing basis to meet the administrative needs of students and teachers or it is taken from large national surveys which are carried out by the top professionals in education and statistics in Israel. We are emphasizing the sources of our data because a discussion of the *deterioration of the education system* is to a large extent based on subjective data cited by parents, teachers, and principals, and on their personal impressions. While this form of data are important and may contribute to new and innovative perspectives, their value and credibility are far less than that of the data on which this chapter is based. It is, of course, possible to interpret the data in different ways and to emphasize different aspects of it; however, in any discussion there is a need to agree that the chosen dataset is the most objective and precise that is available.²

Most of the discussion will focus on the period between 2010 and 2019, the decade prior to the COVID-19 pandemic. The reason for this choice is that the period of the pandemic was an outlier and the extent of its effects and its ongoing and more long-term effects are not yet known.

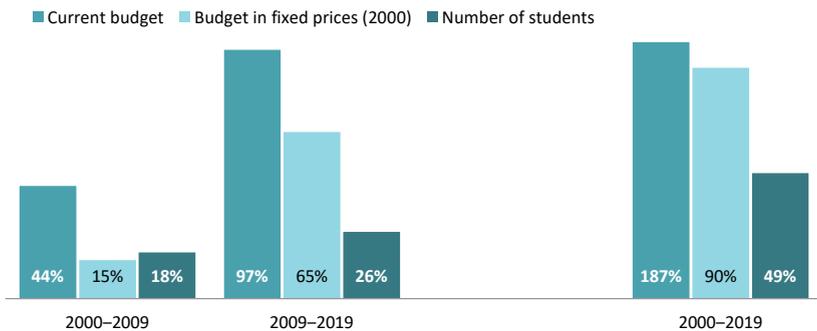
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- 1 The School Nurture Index is a socioeconomic index of the school population. In this chapter, differences based on gender differences or among the different supervisory authorities will not be discussed.
 - 2 Even if we accept that the Ministry of Education, and sometimes also RAMA, may have an agenda with respect to how the data are presented, the scope of the data, and which data to present, we still have no doubt as to the reliability of the published data and its reliability.

The budget

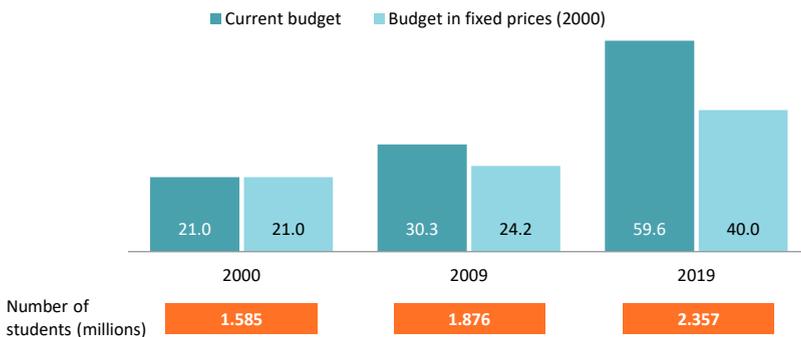
Many educators tend to underplay the importance of the budget available to the education system and argue that it is not the size of the budget that is important, but rather if it is used efficiently and effectively. Furthermore, it has been said that even if the claim is true — “without sustenance there is no Torah” — without an appropriate budget framework there is no possibility of maintaining a properly functioning education system. Therefore, it is important to determine whether the budget per student — as opposed to the total budget — has increased in real terms in recent years and how it has been distributed among the various parts of the system.

Figure 1. The rate of growth in the Ministry of Education budget and the number of students in preschool and school (Grades 1–12), 2000, 2010, and 2019

a. Percent



b. NIS billion



Source: Nachum Blass, Taub Center | Data: Ministry of Education, Economics and Budgeting Administration website, *Transparency in Education*

An examination of the Ministry of Education budget as it relates to the increase in the number of students (Figure 1a) shows that, between 2010 and 2019, the number of students in preschools and schools grew by 26%. During that same period the Ministry of Education budget (not including the development budget) grew by 97% in current terms and in real terms (2000 prices) by 65% (Figure 1a and b). During the previous decade (2000 to 2009), the number of students grew by 18% while the budget grew by only 15% in real terms from 2000 to 2010. During the entire period, the budget grew by 90% in fixed prices while the number of students grew by 49%; in contrast, during the first decade the rate of growth in the budget did not keep up with the increase in the number of students.³

The share of the national budget, not including interest payments, allocated to education was 18.7% in 2000, 20.4% in 2010, and 21% in 2019.⁴ In other words, the share of the Ministry of Education budget over the entire period (2000–2019) grew significantly, although the rate of increase was higher during the first decade. Another way of looking at this is to examine the share of total expenditure on education at current prices within the GDP: the share in 2010 was 7.4% while in 2020 it reached 8.6% (CBS, 2021; Table 4.1). Another indicator is the number of weekly work hours budgeted by the Ministry of Education, which also grew much faster than the number of students during this period. Thus, between 2000 and 2010 it grew by 28% while between 2000 and 2019 it grew by 115% (CBS, 2022). In short, all of these statistics show that the resources available to the Ministry of Education — even after taking into account the growth in the number of students — exceeded the resources available in 2010.⁵

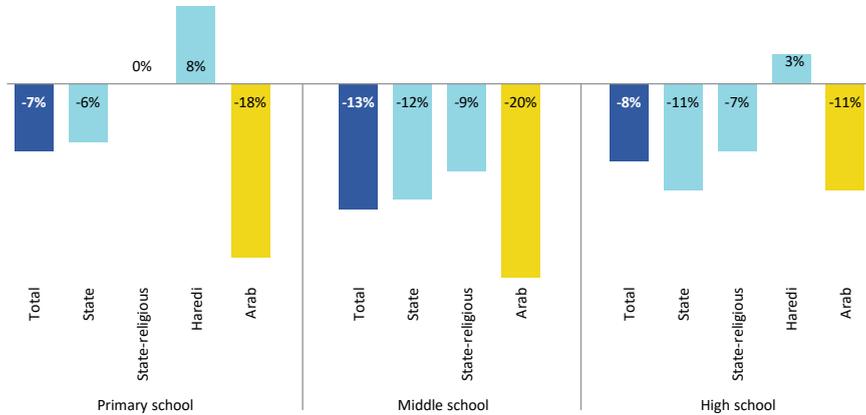
The growth in the Ministry of Education budget was also visible in class size and in students per full-time teacher, as shown in Figure 2. The point that is worth emphasizing is that apart from Haredi education (primarily due to the high rate of increase in the number of students which can be seen in the increase in class size), the population that benefited much more than others from the addition to the budget was the Arab sector, which until recently lagged far behind the Hebrew education sector.

3 Ministry of Education site, Economic and Budget Authority, *Facts and Figures*.

4 Ibid.

5 Note that the increase in budget was not uniform throughout all parts of the education system and there were parts in which the budget grew at a faster rate. Prominent among them is special education and preschool education. According to the preliminary data available, the situation did not change in 2020.

Figure 2. Rate of change in the number of students per full-time teaching position, 2019/2020 vs 1999/2000

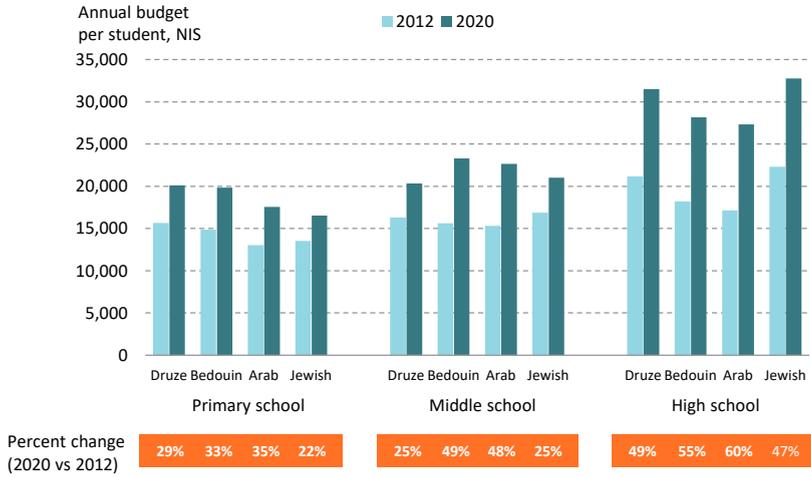


Source: Nachum Blass, Taub Center | Data: Ministry of Education

Figure 3 presents the increase in budget per student in the official primary education system, in the middle schools, and in the high schools, according to sector for 2012–2020. The graph clearly shows the rapid improvement in the budgets in Arab and Bedouin education, while the improvement in the Hebrew and Druze education sectors was much slower. The fact that in general the budget per student in both primary education and high school education is larger in the Arab and Druze sectors reflects the much larger share of students in those population groups from weaker socioeconomic backgrounds. This is not particularly noticeable in high school education because in this stage the budget per student is much less affected by socioeconomic background (in the high school system, there is no Nurture Basket nor differential budgeting according to socioeconomic background).

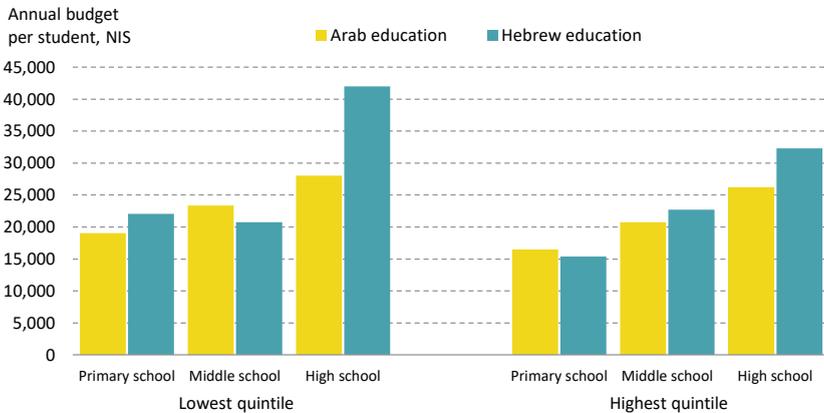
The current, largely positive picture does not properly reflect the worrying reality and persistent inequality between schools serving different population groups of similar socioeconomic status. This is seen in all education levels and is particularly noticeable in high school where the budget per Arab student is 67% of the budget per student in the Hebrew education system.

Figure 3. Annual budget per student in current prices in official primary education, middle school, and high school by education sector, 2020 vs 2012



Source: Nachum Blass, Taub Center | Data: Ministry of Education, Economics and Budgeting Administration website, *Transparency in Education*

Figure 4. Annual budget per student in the Hebrew and Arab education systems in the lowest and highest socioeconomic quintiles



Note: In the Arab sector, the comparison is between the lowest quintile and the fourth quintile because there are no students from the highest socioeconomic quintile.

Source: Nachum Blass, Taub Center | Data: Ministry of Education, Economics and Budgeting Administration website, *Transparency in Education*

Overall, there has been some improvement both in the level of expenditure per student and the narrowing of gaps between student in the Hebrew and Arab education systems; however, it cannot yet be said that the gaps have been eliminated. In fact, there is a long way to go.

Academic achievements

This section will examine the academic achievements of students in Israel in a number of subjects, and will provide a basis for comparisons over time. Achievements of primary school students are evaluated based on the results of the Meitzav exams which are administered in Grade 5 and the PIRLS exams which are given in Grade 4. The achievements of students in middle school are evaluated according to the results on the Meitzav exam administered in Grade 8 and on the TIMSS exam which is also given in Grade 8. The achievements of high school students are evaluated on the basis of the PISA exam, which tests the achievements of 15-year-olds (most of whom are in Grade 10). The tests in primary school and in middle school are calibrated to enable a comparison of scores.⁶ Achievements on the Bagrut (matriculation) exams can be compared only over time with respect to the share of students taking the exams; the share of students who pass all the Bagrut requirements (which enables them to apply for entrance to institutions of higher education); and the share who obtain a Bagrut with honors. Since the exams are not calibrated, there is currently no way to say whether they are easier or more difficult than in the past.

6 Until 2008, there were no achievement tests that were comparable over time. The survey exams, which were conducted in the 1950s and 1960s, the national feedback exams, which were conducted in the 1980s and 1990s, and the Meitzav exams, which were conducted in the early 2000s, were not calibrated in a way that enabled a comparison over time. It is, therefore, impossible to discuss in a valid and scientific manner whether there was an increase or a decrease in academic achievements on the basis of these exams. This situation changed in 2008 when the Meitzav exams became calibrated.

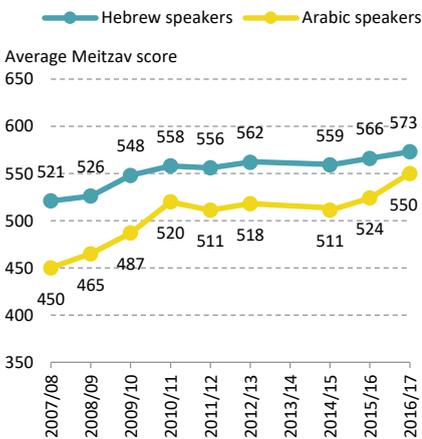
Primary education

The Meitzav exams, Grade 5

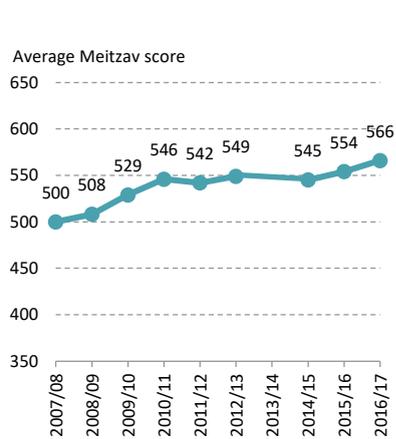
The data for the Meitzav exams presented below relate to the 2007/2008 to 2016/2017 school years.⁷ In order to be able to compare the exam scores of students in the various sectors, discussion will focus on the exams in mathematics and English (as a second language). Figure 5 presents the scores in mathematics for Grade 5 which clearly show a consistent improvement over time and a narrowing of the gap between Jewish and Arab students.

Figure 5. Average scores on the Meitzav mathematics exams in Grade 5

Hebrew speakers and Arabic speakers



All schools



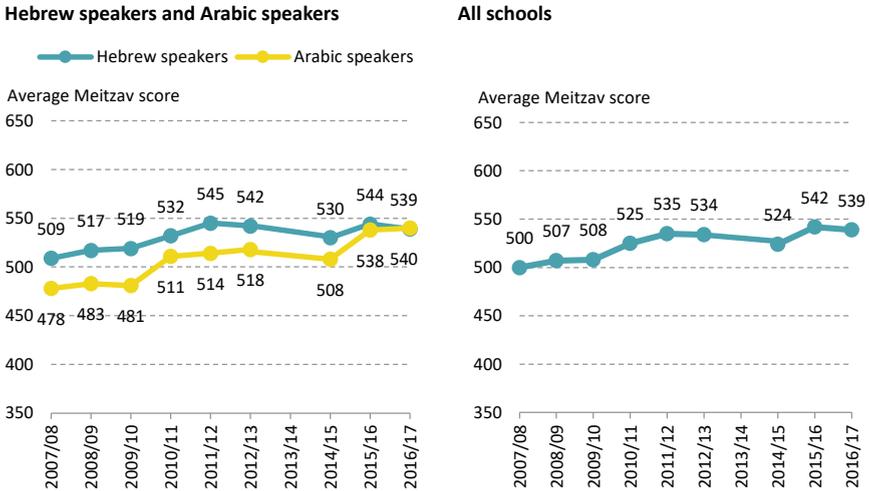
Note: In the 2013/2014 school year, no Meitzav exams were administered.

Source: Nachum Blass, Taub Center | Data: RAMA, 2017a

The situation in English in those years is similar: there is a continuous improvement for the population as a whole, with a major improvement among Arabic speakers and a closing of the gap and a narrowing of disparities related to socioeconomic status over the years (RAMA, 2017a, p. 42).

⁷ RAMA did not publish the results of the mathematics and English exams for Grade 5 in 2017/2018 for various methodological reasons, and since a comparison of reading literacy between Jews and Arabs has no meaning, we decided to make the comparison to the 2016/2017 school year despite it being several years ago.

Figure 6. Average scores on the Meitzav English (as a second language) exams in Grade 5



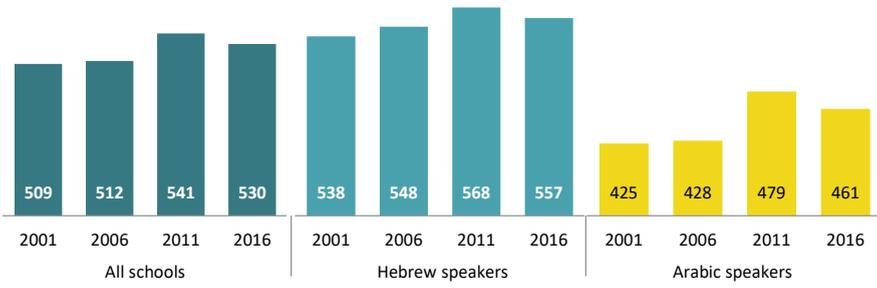
Note: In the 2013/2014 school year, no Meitzav exams were administered.

Source: Nachum Blass, Taub Center | Data: RAMA, 2017a

The PIRLS exam

The PIRLS exam evaluates reading literacy among Grade 4 students. The data in this paper are from 2016,⁸ and could certainly have been left out of any discussion of developments in the last decade, but for consistency reasons we decided to present them here. The achievements of students in Israel on these exams have also been on an upward trend since 2001, although a slight downward trend can be seen between the exams in 2011 and 2016 (RAMA, 2016).

⁸ The last PIRLS exam in Israel took place in 2022 and the results are expected in 2023.

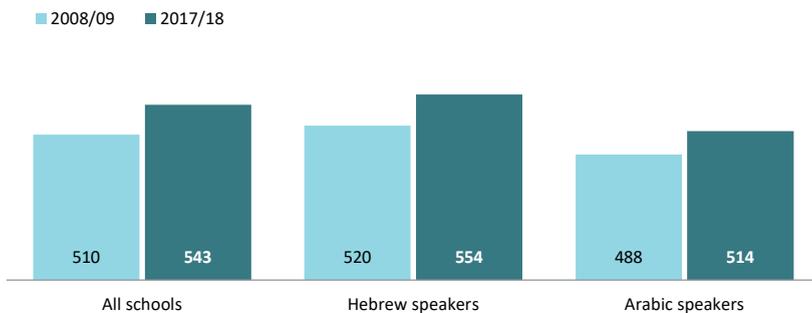
Figure 7. Average scores in reading literacy on the PIRLS exams

Source: Nachum Blass, Taub Center | Data: RAMA, 2017b

Middle school

Meitzav Grade 8⁹

In addition to language arts in Hebrew (or Arabic in the case of Arabic speakers), English (as a second language), and mathematics, students in Grade 8 were also examined in science. In mathematics (Figure 8), there was an improvement in the scores of the overall population, although it was largest among Hebrew speakers, and the gap widened somewhat. In English, the overall score rose while the main improvement was among Arabic speakers. In science, the improvement is more visible and the overall score among Arabic speakers rose by more than a standard deviation (RAMA, 2018).

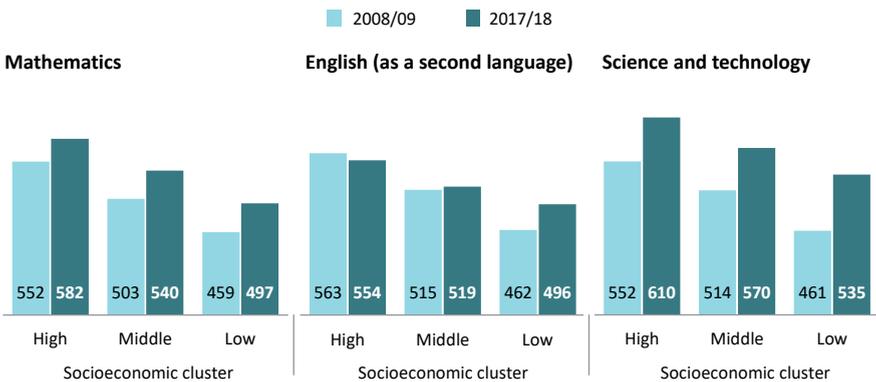
Figure 8. Average scores on the Meitzav mathematics exams in Grade 8

Source: Nachum Blass, Taub Center | Data: RAMA, 2018

9 Although some of the Grade 8 students attend primary schools, their curriculum corresponds to that of students in middle schools.

A look at the Meitzav data, where trends can be seen by socioeconomic level (Figure 9), shows a significant narrowing of the gaps. Thus, the gaps between the various socioeconomic groups in all of the subjects were larger in 2008/2009 than in 2017/2018. The narrowing of the gap between the strongest group and the weakest is particularly notable in English.

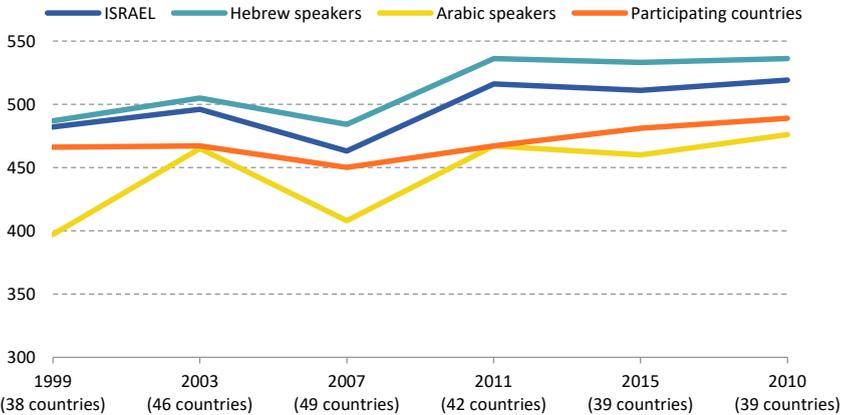
Figure 9. Student scores on the Meitzav mathematics, English (as a second language), and science exams in Grade 8, by socioeconomic cluster



Source: Nachum Blass, Taub Center | Data: RAMA, 2018

The TIMSS exam

Between 1999 and 2019, there was a significant improvement in Israel's scores, with the scores in mathematics and science rising by about 50 points (about one standard deviation; RAMA, 2020b). Since 1999, only 16 countries have participated in all of the TIMSS exams (see Appendix Table 2). In 1999, Israel was in 13th place among 16 in the two subjects, but in 2019 it rose to 9th place in science and 7th place in mathematics. In other words, in comparison to the countries participating in all of the exams, Israel's students improved both their absolute scores and their relative ranking. Nonetheless, it is worth noting that in recent years there has been a slowdown in the rate of improvement.

Figure 10. Mathematics scores on the TIMSS exams

Source: Nachum Blass, Taub Center | Data: RAMA, 2020b

The situation in science is similar to that in mathematics. Here again, between 2011 and 2019 there was only a slight improvement in Israeli student achievements, except for a small one in the Arab sector.

The gaps between the strongest and weakest students show that while the situation in the participating countries did not change between 1999 and 2019, in Israel the situation improved relative to 1999, and only slightly 2015. It is worth noting that in Israel the share of high-achieving students (among Hebrew speakers) rose while the share of low-achieving students (among Arabic speakers) fell.

Table 1. Average scores and the share of students who scored excellent and those who did poorly on the TIMSS exams in the participating countries and Israel

		1999	2015	2019
ISRAEL (overall)	Average score	466	511	519
	Excellent score	4%	13%	15%
	Poor score	24%	16%	13%
	Spread of scores	314	332	322
Hebrew speakers	Average score	482	533	536
	Excellent score	4%	16%	19%
	Poor score	19%	9%	9%
	Spread of scores	—	302	313
Arabic speakers	Average score	397	460	476
	Excellent score	0%	6%	6%
	Poor score	51%	31%	22%
	Spread of scores	—	337	306
Participating countries	Average score	487	481	489
	Excellent score	6%	5%	5%
	Poor score	12%	16%	13%
	Spread of scores	—	282	284

Note: Excellent score: students who scored *excellent* on the exams; poor score: students who scored *below minimum*.

Source: Nachum Blass, Taub Center | Data: RAMA, 2020b

High schools

As noted previously, the achievements in high school are also measured by results on the Bagrut exams and the PISA exam, which assesses the achievements of Israeli students at age 16 (most of whom are in Grade 10 with some in Grade 9 or Grade 11).

The Bagrut exams

A Bagrut exam in Israel is virtually a necessary precondition for entering higher education and for social mobility. Therefore, a Bagrut certificate — particularly one which includes 5 units of mathematics and 5 units of English — is one of the most widely accepted measures of success for the education system in one of its main tasks, namely to increase opportunities of students to enter

higher education and to succeed in the job market. An increase in the share of students who graduate with a Bagrut certificate is perceived to be highly important, both for society and for the individual, and the publishing of the Bagrut results and the relative achievements of the students from various populations sectors receives wide public attention.

One of the problems in identifying an improvement or a deterioration in the achievements of Israel's students on the Bagrut exams is the lack of score calibration, which prevents making reliable statements about their level of difficulty, and, by extension, drawing conclusions regarding the level of students' knowledge. There are those who claim that improvements in the Bagrut rates are the result of lower exam standards, and they also claim that the education system is deteriorating. Another claim is that within some groups in the population success on the Bagrut exams is achieved by an increase in the level of cheating.¹⁰

There are also those who believe that the large increase in the share of students taking and passing the Bagrut exams is sufficient to indicate a lowering of the exams' standards. According to them, major improvements in the intellectual abilities of students cannot occur in such a short period (20 years, as we will see below). Therefore, only the lowering of standards can explain the increase in scores. Those who support this claim also believe that even if it is possible that the social benefit from increasing the level of eligibility exceeds the damage from lowering standards, this does not contradict the claim that the exam standards have been lowered.

Those who deny this claim feel that less stringent conditions for qualifying to take the exams and perhaps even a reduction in the material covered by the exams does not automatically lead to a less difficult exam. Thus, as long as the exams are not meant to test the students' abilities to work under time pressure or to memorize large quantities of material, the easing of the exams' conditions (such as spreading the exams over several years and reducing the amount of learned material) will not necessarily harm the ability to evaluate a student's achievements. If the exams reveal the students' ability to deal with difficult questions, to understand complicated material, and to deal with a subject on a high level of sophistication, as well as good levels of self-expression, then there is nothing intrinsically wrong with easing exam conditions.

10 The data available for this study show that even if cheating is more common among certain groups, its scope (only a few percent of all examinees) cannot explain the large increase in Bagrut eligibility rates.

Some educators believe that a reduction in the amount of learned material covered by the exams, accompanied by higher-quality teaching and a guarantee that every student reaches a minimum level of comprehension skills and an ability to apply learned material, then not only will the level of learning not be compromised, but the educational process is likely to improve.¹¹ In the opinion of these researchers, an excessive burden on the student leads to superficial and rote learning rather than a real understanding of the material. The question is not whether students should learn less material and whether the conditions of the exams are less stringent than in the past, but rather whether students today are required to reach a higher or lower level of understanding and analytical ability than in past years.

A well-grounded response requires comprehensive research to compare the level of difficulty of Bagrut exam questions in the past and the present, something which to the best of our knowledge has not yet been done. The only research that indirectly dealt with this issue — and whose relevance is limited in view of the year in which it was carried out — is that of Prof. Baruch Nevo and his colleagues on the second sitting of the Bagrut exams. Their research did not find any decline in the level of the exam for the second sitting nor in the criteria for marking the exams (Nevo et al., 2005). It is difficult to understand why these issues have not been examined more thoroughly in Israel, whether by RAMA or some other research body.¹² The questions of whether there is a need for Bagrut exams at all and, if there is, whether their level of difficulty should be calibrated are important in their own right and require a public and professional discussion before a decision is made.

Notwithstanding what has been said so far, there are several findings that are relevant to the question of whether the Bagrut exams achieve the goals set by the education system. They will be discussed based on data from the Ministry of Education website (Economic and Budget Authority — *Facts and Figures and Transparency in Education*) and the *Statistical Abstract of Israel No. 72* (CBS, 2021).

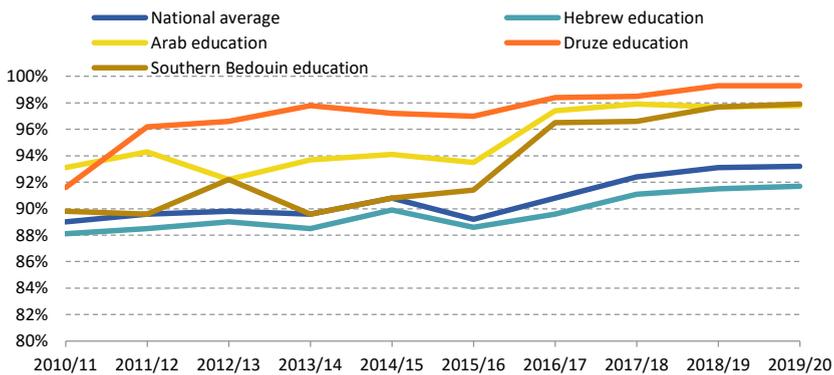
11 The late Prof. Chaim Adler, winner of the Israel Prize for Education, for example.

12 The Chief Scientist's Office in the Ministry of Education brought a group together which discussed the issue and concluded that there are major methodological difficulties in comparing the level of difficulty between exams. In the end, it was decided not to carry out a comprehensive study of the issue (information provided by Dr. Nora Cohen, the administrator of the Chief Scientist's Office at that time).

Students in Grade 12 as a share of the age cohort — Unfortunately, the Ministry of Education has stopped publishing this statistic. It is an important piece of data because it shows the extent to which youth in Israel — including Haredim and Arabs in East Jerusalem — continue attending an educational framework and in particular frameworks that lead to the Bagrut exams.¹³ Removing East Jerusalem and Haredi students (because they choose not to take the Bagrut exams for ideological reasons) from the denominator (i.e., from the total 17-year-old cohort) yields a higher rate of eligibility to take the exams.

The share of Grade 12 students taking the Bagrut exams — The share of Grade 12 students taking the Bagrut exams has increased during the past decade from 89% in 2010 to 93.1% in 2019 (Figure 11).¹⁴ There are disparities, though, among population sectors. Particularly notable is the Druze sector which improved from 91.6% to 99.3%, and the Bedouin sector which improved from 89.8% to 97.7%.¹⁵

Figure 11. Share of students taking the Bagrut exams out of all students in Grade 12



Source: Nachum Blass, Taub Center | Data: Ministry of Education, Economics and Budgeting Administration website, *Transparency in Education*

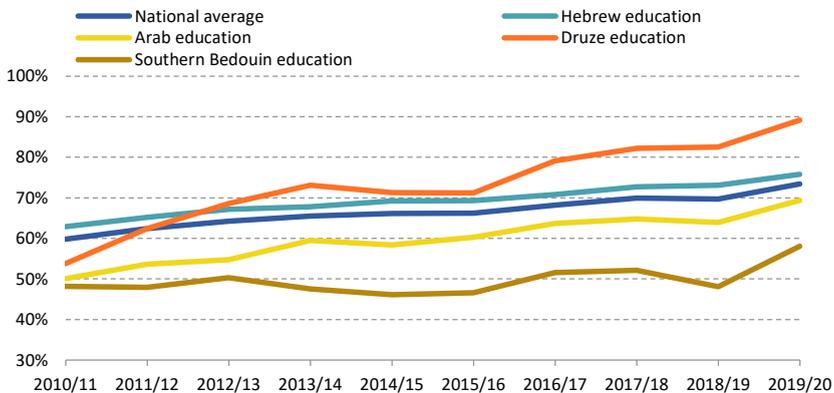
13 Despite the aforementioned, because there are students from various age cohorts studying in Grade 12 and the vast majority of the relevant age group attends some kind of educational framework, it may be that this statistic is less important than it might at first appear to be.

14 We are not taking into account the data for the 2020 Bagrut exams, which in our estimation are of less importance due to the exemptions provided during the COVID-19 pandemic.

15 These figures are somewhat lower than those according to the CBS data (2021, Table 4.19), according to which the share of Grade 12 students taking the Bagrut exams in 2019 was 86.4%. However, the reason for this disparity is apparently the different definitions used as the basis of the calculation. Nonetheless, the differences do not explain the large increase in the share of students taking the Bagrut exams.

The rate of qualifying for a Bagrut certificate among Grade 12 students — According to Ministry of Education data, the share of those qualifying for a Bagrut certificate from among those who took the exams rose from 59.8% in 2010 to 69.7% in 2019 (Figure 12). Here again the Druze sector stands out with an increase in rate from 53.8% to 82.5%, as well as the Arab sector which increased from 50.1% to 69.4% (or 65.8% according to the CBS). Any student who fails to qualify on the Bagrut exams for a Bagrut certificate can study and take the exams in an external setting, and of the students who completed their studies in 2012, 15% of the ineligible ones (3,905 students from among 26,038) later completed the exams and qualified for a Bagrut certificate.

Figure 12. Share of those qualifying for a Bagrut certificate out of all students in Grade 12



Source: Nachum Blass, Taub Center | Data: Ministry of Education, Economics and Budgeting Administration website, *Transparency in Education*

The share of those qualifying for a Bagrut certificate who meet university entrance requirements out of all those qualify for a Bagrut certificate — There has been a significant improvement also in this case. Between 2000 and 2015, this rate increased from 41.4% to 50.9% and in 2019 it reached 56.2% (CBS, 2021; Table 4.19). In 2009, it was only 45.6% (CBS, 2011, Table 8.23). In 2009, the rate in the Druze education system was 41.5% and among the Arabs it was 31.6%. In contrast, by 2019, it was 48.4% in the Arab education system.

The share of those qualifying for a Bagrut certificate with honors among all Grade 12 students — According to data on the Ministry of Education site *Transparency in Education*, the share of students who qualify for a Bagrut certificate with honors increased from 6.5% in 2014 to 8.8% in 2019 (we will not be discussing the 2020 data). The actual improvement may in fact be smaller due to the change in the definition of a Bagrut certificate with honors; nonetheless, the improvement was still significant.¹⁶

The share of Bagrut certificates with 5 units of mathematics and 5 units of English — The Ministry of Education has set a goal of increasing the share of students studying high-level mathematics and English. And indeed, the share of Bagrut certificates with 5 units of English increased from 30.7% in 2014 to 39.1% in 2019. In mathematics, the share rose from 9.5% to 15.5%.

At the end of the day, it can be said that the education system has made impressive achievements in many aspects of eligibility for a Bagrut certificate. It is reasonable to assume that within the cohort of students who completed high school in the 2018/2019 school year, close to 75% will qualify for a Bagrut certificate after they complete the exams in subjects which they previously failed or which they did not take, and at least 60% will qualify for a certificate that meets university entrance requirements.

The PISA exam

The achievements of Israel's students on the PISA exam show a slight downward trend or stability on the last three tests (since 2012) in contrast to the results of the TIMSS and PIRLS exams. Nonetheless, the results of the PISA exam in 2018 were better than those in 2009 and 2000. This can be seen in RAMA's abstract for the 2018 PISA report:

From 2006 until 2012, there was an increase in achievement in reading literacy and mathematics. In science, there was no major change relative

16 Until the 2015/2016 school year (inclusive), a Bagrut certificate with honors was defined in one of two ways: (a) a certificate of 30 units, of which 5 are in English and at least 4 are in mathematics and the weighted average [of all the scores on the certificate] is at least 90; or (b) a Bagrut certificate of at least 25 units, of which 5 are in English and 5 are in mathematics and the weighted average [of all the scores] is at least 95. Beginning in the 2018/2019 school year, a Bagrut certificate with honors was defined as follows: a Bagrut certificate with 5 units of English and at least 4 units of mathematics with an average score of at least 90 and honors in a personal development and social involvement program.

to 2006. The changes in Israel's achievements from 2006 to 2018 are as follows: there was a large increase of 31 points in reading literacy (from 439 to 470); in mathematics, there was a moderate increase of 21 points (from 442 to 463); in science there was a not significant increase of 8 points (from 454 to 462). Among Hebrew speakers, the increases are comparable to those for all students in Israel while among Arabic speakers there was no clear trend. Relative to 2015, there were no significant differences in any of the three subjects (RAMA, 2019).

In comparing results for Israeli students to the OECD student average, it appears that the gap in reading literacy narrowed from 53 points in favor of the OECD students to only 10 points between 2006 and 2012. Meanwhile, the gap increased to 17 points between 2012 and 2018. The gap in mathematics was 54, 28, and 26 points respectively while in science it was 46, 31, and 27 points respectively (see RAMA, 2019, p. 10). Essentially, the picture according to PISA is one of significant improvement from 2000 to 2012, stability with somewhat of an increase up to 2015, and a slight decrease in 2018.¹⁷

In an examination of the gaps between Hebrew speakers and Arabic speakers, the data shows that since 2006 there has been an improvement in the share of honor students among Hebrew speakers alongside a drop in the rate of poorly performing students. The rate of honor students in the three subjects together (reading literacy, mathematics, and science) increased by 2% while the share of poorly performing students in the three subjects combined fell by 9%. In contrast, the share of honor students among Arabic speakers was negligible in all the subjects and across all of the tests over time, and in most cases there was an increase in the share of poorly performing students. In addition, the share of poorly performing students in all three subjects together rose, such that the gap widened (RAMA, 2019).

17 See Appendix Table 1. With respect to the 2018 exam, the data (as they appear in the official PISA report in the section on the attitude of the examinees toward the exam) present an interesting but worrying picture. Students in Israel (and in particular students at low levels of achievement, most of whom are apparently Arabs) demonstrated a low level of interest and a lack of desire to invest effort in order to succeed on the exam. The phenomenon was particularly acute in 2018. We do not have any explanation for this, although it may explain the surprising drop in the achievements of Arab students (see Weinreb & Blass, forthcoming).

Comparison of achievements on the Meitzav exam and the international tests: Final comments

While the Meitzav and Bagrut data for Israel show a clear upward trend between 2000 and 2019, the data on the international tests is more complicated and they should be looked at within a broader context of Israel's economic and background characteristics. Some of the studies by Israeli researchers have shown that, in general, Israel's ranking on international tests is in line with its economic level, its annual budget per student, and its demographic structure (Blass, 2016; Cahan et al., 2017; Feniger & Shavit, 2011; Yogev et al., 2009). Moreover, the PISA 2018 report presents two graphs which show that the achievements of students in Israel are higher than expected relative to its GDP per capita and more or less in line with what would be expected according to budget per student (OECD, 2019, pp. 65–66).

Teaching manpower

The discussion of the development of the education system in Israel cannot be separated from the public debate over the shortage of teachers that accompanied the start of the 2022/2023 school year. First, it is worth mentioning that this discussion seems to be an annual event. For example, in February 2011 an expert in the teaching of mathematics sent a letter to the Minister of Education in which she warned that mathematics education in Israel is liable to pay a heavy price due to the severe shortage in mathematics and physics teachers. "We are past the 11th hour," she wrote (Valmer, 2011). In August 2016, a worrying article was published on the teacher crisis. It mentioned steps that had been adopted out of desperation, such as the hiring of students without training to fill teaching positions and the teaching of English by geography teachers (Trabelsi Hadad, 2016). A further article dated May 2019 quoted the State Comptroller who surveyed the shortage in high-quality teachers: "Many students are taught by teachers who did not specialize in the subject they are teaching" (Dvir, 2019). And finally, in July 2022, Dalit Stauber, the Director General of the Ministry of Education, described the severe shortage in manpower and called on the government to accelerate the signing of wage agreements with the teachers (Somfalvi, 2022).

We could have brought dozens, if not hundreds, of other quotes from past years and from other contexts but these are sufficient to illustrate that the discussion of the *teacher shortage* and the *severe manpower crisis in teaching* has been with us for many years. The persistence of the discussion does not imply that there is no crisis — it may be that the crisis persists and that the discussion occurs in parallel. Therefore, the rest of our discussion will be devoted to claims that there is indeed a crisis.

It appears that despite the popularity of claims regarding the teacher shortage, the data indicate that the number of teachers has grown much faster than the number of students and class size. Thus, even if there is a basis for the claims of a teacher shortage, that current shortage is less than it was in the past.

With regard to the quality of teachers, there is a consensus among researchers that there are no tools to objectively and reliably address this question. This is because defining the outputs of education is also dependent on one's value-based attitudes and beliefs. Another reason is the lack of reliable tools for measuring output, even when the tools are agreed upon. Essentially, it is for these reasons — and for reasons of administrative efficiency — that policy makers, educators, and researchers use a few accepted indicators of teacher quality, including seniority, academic education and cognitive skills (according to achievements on the Bagrut and psychometric exams), even though many believe that there is little connection between these parameters and the quality of a teacher.¹⁸ We first examine the claim of a teacher shortage and then the data on teacher quality as measured by the various indices.

The teacher shortage

According to CBS data, the number of teachers in the system grew by 2.7% in the 2020/2021 school year relative to 2019/2020, and, during the past decade (2010/2011 to 2021/2022) the change in the number of teachers has risen on average 3.2% annually (Table 2; CBS, 2022). Not only has there been overall growth, but it was across all parts of the system, apart from primary education and the Arab sector. Not only has the number of teachers grown relative to the number of students, the average number of instruction hours has also risen during the past decade at a faster rate than the number of students.

18 For a more detailed discussion, see Blass (2011).

Table 2. Number of teachers in the 2020/2021 and 2021/2022 school years and the rate of change over the last decade and the last year

Sector, supervisory authority, education level	2020/2021	2021/2022	Average annual change, 2010/2011 to 2021/2022 (percent)	Average annual change, 2020/2021 to 2021/2022 (percent)
Total	193,100	198,270	3.2	2.7
Hebrew education	149,026	154,038	3.4	3.4
Preschool	16,611	17,841	5.0	7.4
Primary school	71,755	73,337	3.1	2.2
Middle school	31,231	32,276	2.9	3.3
High school	45,227	46,289	2.7	2.3
State education	90,033	91,730	3.1	1.9
State-religious	34,799	35,725	3.2	2.7
Haredi	24,194	26,583	4.5	9.9
Arab education	44,074	44,232	2.8	0.4
Preschool	3,171	3,310	2.7	4.4
Primary school	22,388	21,855	1.5	-2.4
Middle school	8,611	8,815	2.7	2.4
High school	11,578	11,783	4.8	1.8

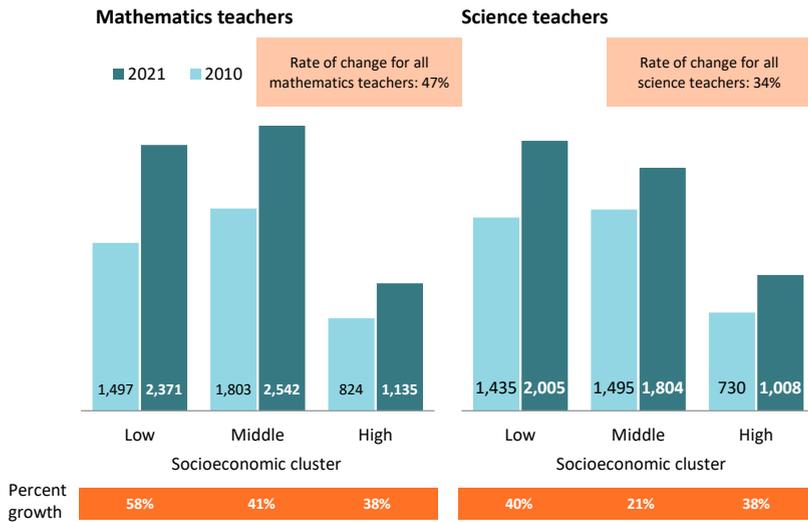
Source: Nachum Blass, Taub Center | Data: CBS

Given that the rate of increase in the number of teachers was greater than the increase in the number of students in all of the years up to 2018/2019, the data imply that, at least until then, the average number of students per full-time teacher and the average class size fell significantly. Both of these phenomena are evidence that recent years have in fact not been characterized by a growing overall shortage in teachers across all levels of education, sectors, and supervisory authorities. If the feeling of a shortage indeed exists, then it must be the result of a limited and temporary shortage in specific locations.

The claim of a teacher shortage and in particular a shortage of high school teachers, can be examined closer and from additional perspectives by looking at the situation of high school science teachers. Data available are for high school teachers in mathematics, physics, biology, chemistry, and computer science. Figure 13 clearly shows that the total number of mathematics teachers grew by 47% between 2010 and 2021 while in the sciences it grew by 34%, which is far greater than the increase (of only about 20%) in the number

of students in high schools that prepare for the Bagrut exams (which are the relevant schools for these subjects) during the same period. Moreover, the increase in the number of teachers was much faster in schools with a lower socioeconomic ranking than in those with a higher socioeconomic ranking.

Figure 13. The number of mathematics and science teachers



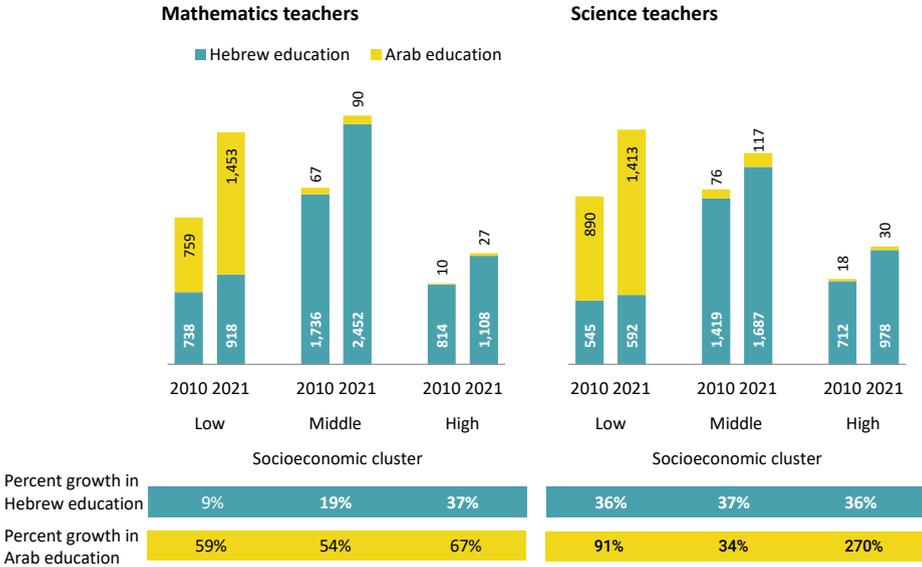
Note: A breakdown by subject (physics, biology, chemistry, and computer science) could have been shown, but since the trends are similar it was decided, for the sake of brevity, to consolidate the data for these subjects.

Source: Nachum Blass, Taub Center | Data: CBS

During the relevant years, i.e., 2010 to 2021, the number of high school students in the Hebrew education system grew by 14% while the number of Arab high school students grew by 37%. Figure 14 shows that in Hebrew education the number of mathematics teachers grew by 37% during this period while the number of mathematics teachers in Arab education grew by 91%. In all of the other subjects, the figures are 25% and 56%, respectively.

In view of these data, the claim that there is a shortage of high school teachers in the sciences and that the existing ones are abandoning the profession appears to be baseless.

Figure 14. The number of mathematics and science teachers, by socioeconomic cluster and education system



Source: Nachum Blass, Taub Center | Data: CBS

There are those who cast doubt on the CBS data, as reflected in claims made at the Mandel Institute conference held on July 24, 2022.¹⁹ However, as long as there is no clear cut and solid evidence that data from the CBS *Statistical Abstracts* are inaccurate, then we will continue to use their data. Furthermore, the CBS is not a stakeholder and their publications are based on data gathered for administrative purposes by the Ministry of Education.

19 For example, a Ministry of Education official stated that: “The solutions currently proposed are on the level of aspirins and band aids. An overall strategic perspective is needed. This is a national issue that needs to be solved on the national level.” A well-known school principal stated that “the flight from the system is leading to a reduction in standards and compromises on quality. Whole subjects are on the verge of extinction. Large groups do not have opportunities available to them and in that sense the system has failed to narrow the gaps. This is a violation of the covenant between the state and its citizens.” Finally, a famous member of academia and an expert on the subject defined the situation in the closing remarks of the conference: “This is our Yom Kippur. An eye-opening and painful day; but we do not have the right to despair.” The quotes are based on what I heard at the conference itself and on the summary of the conference.

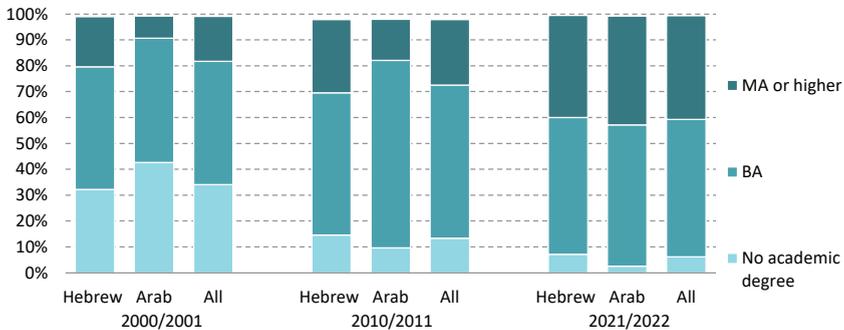
Teacher quality

There are currently no reliable and agreed-upon indicators to rank teacher quality and so we will rely on the conventional parameters to measure it, i.e., teacher level of academic education and the match between their training and the subject they are teaching.

The level of academic education of teachers

Figure 15 shows that the share of degree holders among teachers has risen consistently over time. Most teachers today have at least a bachelor's degree. Of note is the closing of gaps in teachers' education between the Hebrew and Arab sectors. In 2022, the share of teachers with a bachelor's degree in the Arab sector was even somewhat higher than in the Hebrew sector: 54.4% vs 52.8% while the share of teachers with a master's degree or higher was 42% in the Hebrew education sector and 39.4% in the Arab sector. Of course, the question then arises as to whether a teacher with a master's degree is better than one with a bachelor's degree or even one without an academic degree. The question is particularly relevant in the context of the education level. According to the literature, the evidence is ambiguous particularly in the case of the value of a master's degree.²⁰

Figure 15. Teaching manpower, by sector and education level



Note: The categories do not add up to 100% in the CBS publication.

Source: Nachum Blass, Taub Center | Data: CBS, 2022

²⁰ There are those who believe that this raises the costs of the education system since a teacher with a master's degree receives a higher salary without necessarily improving their performance (Blass, 2008).

There are those who believe that the institution where a teacher studied for their degree is an indicator of the quality of their training. Thus, a teacher who studied at a university has an advantage over a teacher who studied at a college or a teachers' college. However, there is no data to confirm this assertion. According to a recently published article, the share of teachers who studied at a university and who joined the education system in 2017 was lower than the number who joined the education system in 2008 (CBS, 2019). This is generally true also with respect to differences in achievement on the Bagrut exams or the psychometric exam when comparing teachers who joined the education system in 2011 to those who joined in 2019.

The Hebrew sector — In the case of teachers teaching language arts, scores on the Bagrut exams were lower among those who joined the education system in 2019 (between 2 and 5 points) and their scores were similar on the psychometric exam, depending on the level of education they were teaching in (the gap was larger in primary schools and smaller in high schools). Among mathematics teachers, the gap in scores on the Bagrut exam in mathematics was between 1 and 5 points, although there was almost no difference in quantitative thinking on the psychometric exam. Here again, the gap was dependent on the level of education. Among English teachers, the scores on the Bagrut exam in English showed an upward trend (of about 5 points), as did the scores in English on the psychometric exam (between 4 and 10 points), depending on the level of education.

The Arab sector — The Bagrut scores of language arts teachers in the Arab sector were, in general, similar or better than of their peers in the Hebrew sector. In the case of mathematics, the percentage of those who took the Bagrut exam in 5-units of mathematics was generally higher in the Arab sector than in the Hebrew sector, while in the case of English it was lower in the Arab sector; in both sectors there was an upward trend. In contrast to the Bagrut exams, the achievements on the psychometric exam of new teachers in the Arab sector were consistently lower than those of their counterparts in the Hebrew education sector.²¹

In sum, although there has been a major improvement in the level of training among new teachers and in the average level of education of all teachers relative to the past, there are also signs that in recent years the level of new

21 The most recent data available are taken from a publication of the CBS (2019).

teachers has not been improving and has even declined somewhat. The question is then whether an increase in level of education compensates for a decline in teachers' background data, which is reflected in their achievements on the Bagrut exams and on the psychometric exam.

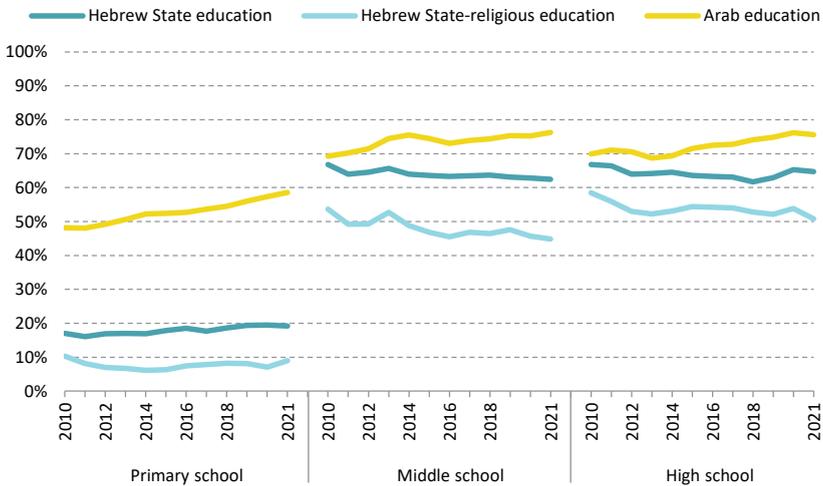
The match between teacher training and the subject they teach

In order to assess the match between a teacher's training and the subject they teach, three perspectives (at least) need to be considered. The first is the situation at a specific point in time; the second is the situation over time; and the third is a comparison to other countries.

The following discussion will focus on only the first two perspectives. Figure 16 describes the situation in the teaching of Hebrew (language arts); Figure 17 describes the situation in mathematics; and Figure 18 describes the situation for English teachers (English as a second language).²² Figure 16 shows that in primary education only about 20% of teachers in the Hebrew State education system (and about 10% in the State-religious education system) who teach Hebrew have training that matches the subject they are teaching. This situation has remained unchanged over the past decade. The reason may be that school principals feel that Hebrew as one's mother tongue is sufficient training to teach language arts, in addition to teaching skills. In the Arab sector, where the teachers' mother tongue is Arabic, separate training in teaching Hebrew is almost always a necessary requirement and, therefore, the share of teachers who are trained in teaching Hebrew language arts reaches 60%.

In middle schools and high schools, the match between teachers' training and the subject they teach is better than in the primary schools, and in the State system it is better than in the State-religious system, although a clear decline is seen. This could possibly be attributed to the steep decline in the number of students studying liberal arts or the social sciences and to the lower priority given to these subjects relative to mathematics and English by the education system. Here, too, the situation in the Arab sector is better than in the Hebrew education sector.

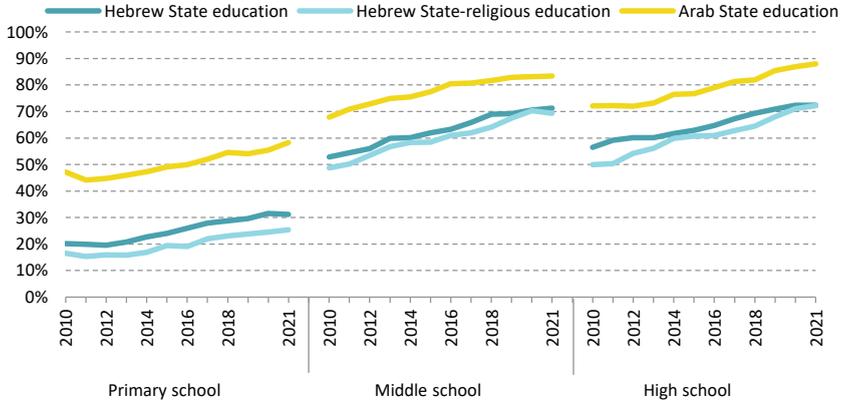
22 It is worth mentioning that the match between a teacher's training and the subject they teach is almost always measured by the teacher's type of professional training. Nonetheless, studies have not found a correlation between a teacher's degree and their students' academic achievements. In our context, it is perhaps worthwhile mentioning that the match to a teacher's subject is highest in Arab education and lowest in Hebrew State-religious education, although the academic achievements of students in these sectors are not necessarily correlated with the quality of the match.

Figure 16. Share of language arts (Hebrew) teachers with appropriate training

Source: Nachum Blass, Taub Center | Data: CBS, 2022

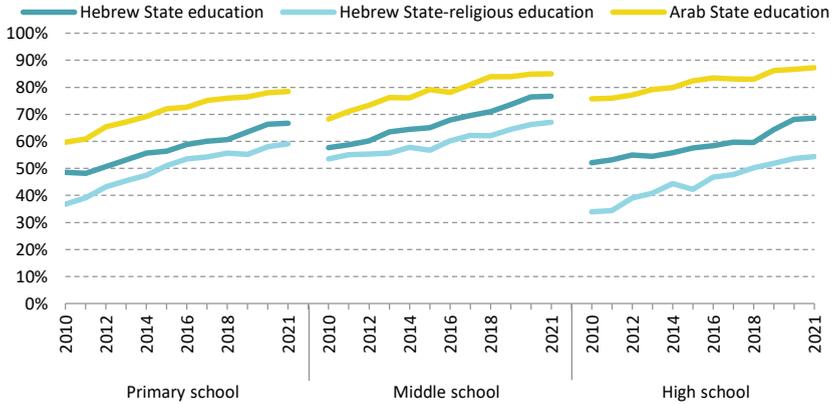
With respect to the match in mathematics and English, in 2021 there were still many teachers whose training did not satisfy the requirements of the Ministry of Education. Nonetheless, the data indicate that the current situation is better than in the past — at all levels of education and in all of the population sectors. Here again, the Arab sector seems to be in a better situation, which can perhaps be explained by the fact that many of the Arab teachers are young and have just completed their training in teachers' colleges. This means there is a surplus of teachers enabling a better match between young teachers and their training. In the end, although there is criticism that there are too many teachers teaching subjects they aren't trained in, there has been a significant improvement in this situation in recent years.

Figure 17. Share of mathematics teachers with appropriate training



Source: Nachum Blass, Taub Center | Data: CBS, 2022

Figure 18. Share of English (as a second language) teachers with appropriate training



Source: Nachum Blass, Taub Center | Data: CBS, 2022

Teachers' wages

The issue of teachers' wages has recently been the focus of public discourse.²³ Below we will examine the development of teachers' wages over the past decade, both from an absolute perspective and also relative to other professions in Israel, as well as relative to other countries.

The most recent CBS press release devotes significant attention to this subject (CBS, 2022). It states that, between 2000 and 2020, the average monthly wage rose by 90.1% while the hourly wage rose by 43% (Figure 19). During those two decades, the CPI rose by 34% and during the last decade it rose by 8.5%. In this context, it is worthwhile considering a few additional points:

1. The wages of women teachers improved more than those of men teachers, particularly in hourly terms.
2. The wages of teachers with high seniority improved more than those of new teachers.
3. The wages of teachers without an academic degree improved more than those of teachers with one (which is apparently the result of the improvement among Haredi teachers, most of whom are eligible for a salary according to a degree that is *equivalent* to an academic degree).
4. There was greater improvement in the wages of teachers in locations with a low socioeconomic ranking, apparently due to the large number of Arab or Haredi teachers. The significant improvement in wages in the Arab sector can be partially explained by an increase in seniority and in education, which has been more rapid than in the Hebrew education sector.
5. The hourly wages of preschool teachers improved the most during the past decade and particularly during the past two decades.
6. The rate of increase in the monthly wages of middle school teachers was the highest, but the increase in their hourly wages was the lowest. This is explained by the new wage agreements, according to which middle school teachers who work about 40 weekly hours are defined as full-time as compared to only 24 weekly hours in previous wage agreements.

23 A few months before the time of writing, a new wage agreement was signed with the Teachers' Union. At this stage, we still do not know how it will affect the education system and therefore it is not discussed here.

Figure 19. Rate of change in salaries of teaching manpower, by selected characteristics

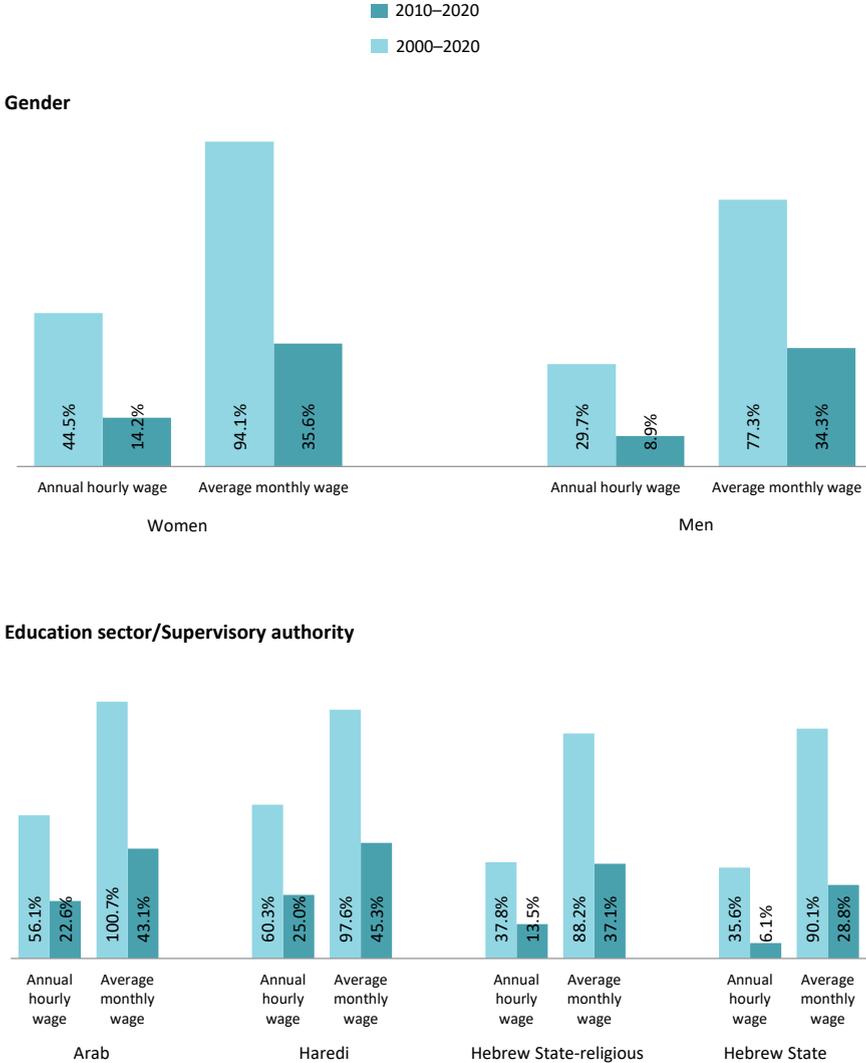


Figure 19 (continued). Rate of change in salaries of teaching manpower, by selected characteristics

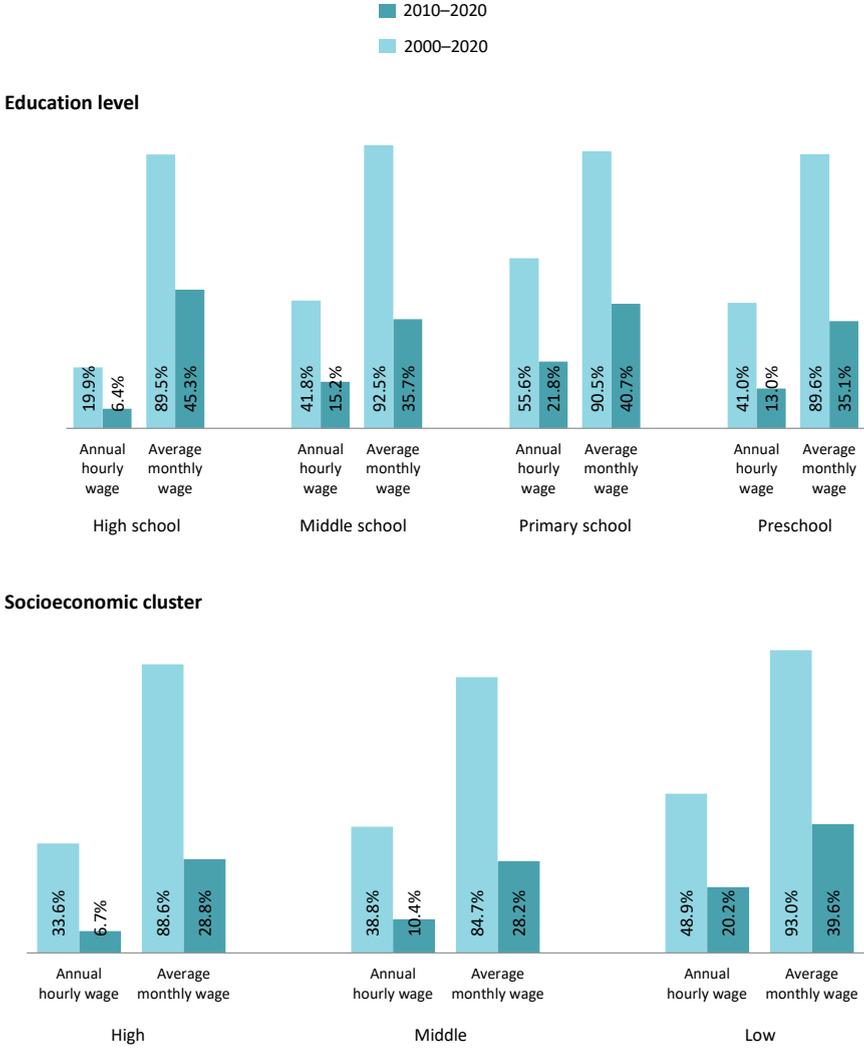
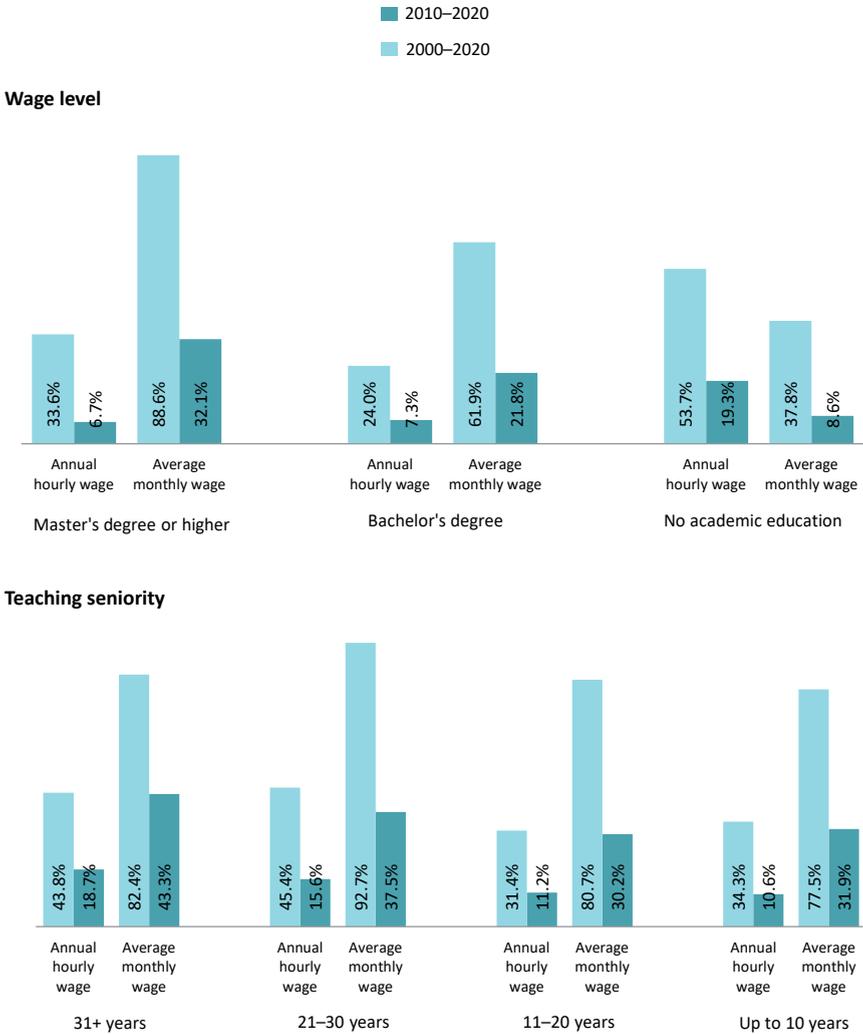


Figure 19 (continued). Rate of change in salaries of teaching manpower, by selected characteristics



Source: Nachum Blass, Taub Center | Data: CBS, 2022, Table 9

School environment

School environment is an important issue which has not received the attention it deserves. The relevant data is gathered by RAMA using questionnaires answered by students and teachers in primary schools, middle schools, and high schools in both the Hebrew and Arab education sectors. The results are shared on the website *The Educational Picture*. Some of the subjects related to educational atmosphere have been surveyed since 2009/2010 while others were introduced later on. The following is a discussion of the data gathered from 2009/2010 onwards.²⁴

Figure 20 presents the change in students' responses to questions asked in 2009/2010 and in 2019/2020. The graph indicates the following:

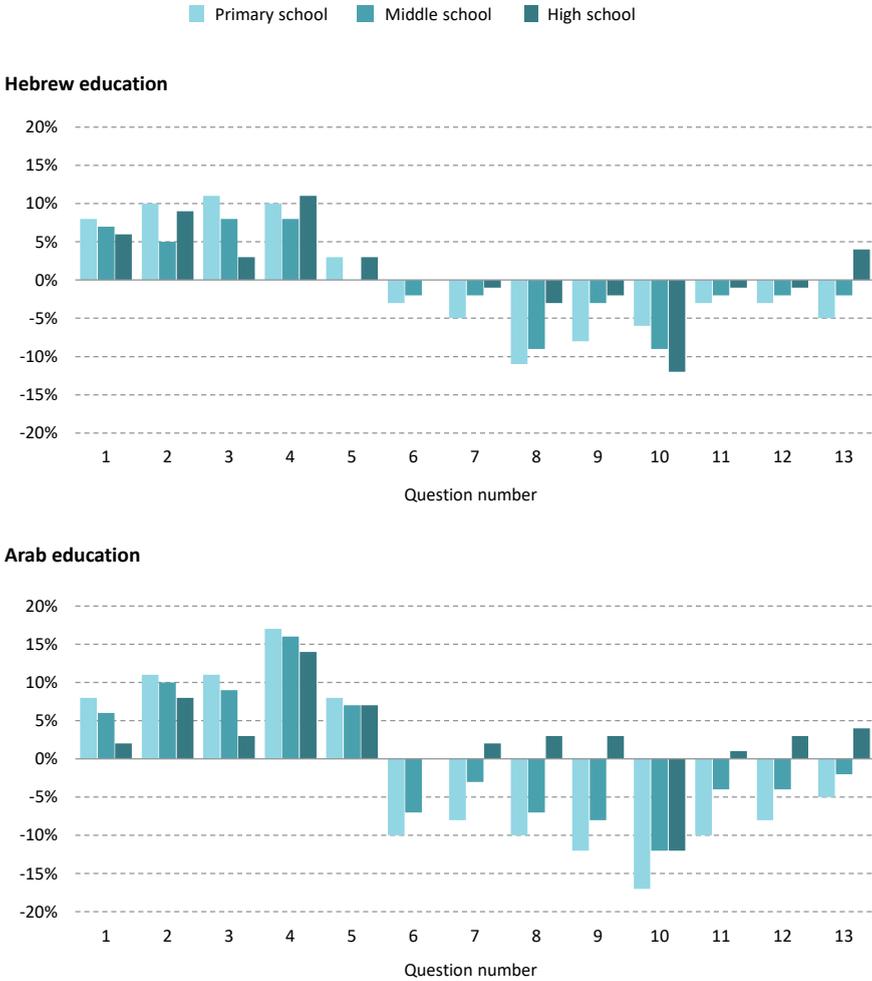
1. The vast majority of student responses indicated an improvement, with just a few — all of them from students in middle school — indicating no change.
2. The improvement in primary schools was usually larger than that in middle schools, and the improvement in middle schools was in turn larger than that in high schools.
3. In primary and middle schools, the improvement in the Arab sector was greater than in the Hebrew sector. In high schools, there were aspects of school environment in which the improvement was greater in the Arab sector and others in which it was greater in the Hebrew sector.
4. It is important to note that students complain about teachers being violent toward them verbally and even physically. Although the situation improved in primary schools and in middle schools, it worsened in high schools. Clearly, such a situation cannot be tolerated.

24 For further details, see the Ministry of Education website, *The Educational Picture*, and the 2009/2010 Meitzav Report (RAMA, 2020a).

Students answered the following questions regarding school environment (Figure 20):

1. A generally positive feeling toward the school;
2. Close and empathic relationships between teachers and students;
3. Positive relationships between students and their classmates;
4. Proper behavior of students in class;
5. Respect and encouragement to learn provided by the teachers;
6. The lack of a feeling of security among the students;
7. Involvement in violent incidents;
8. A student cursed me with the intent of insulting me;
9. A student made fun of me because of my skin color, ethnic origin, or religion;
10. Students break or destroy school property;
11. Students stole something from my personal belongings;
12. A teacher made fun of me, insulted me, or humiliated me verbally in the school;
13. A teacher grabbed me, pushed me, or intentionally hit me.

Figure 20. Changes in students' responses to the school environment questionnaire between the 2009/2010 and 2019/2020 school years, by education level and school sector



Source: Nachum Blass, Taub Center | Data: RAMA

Conclusion

In any discussion of an improvement or deterioration in the education system, it is important to remember that it is not a separate entity from other systems in Israeli society. It is part of Israeli society in all of its aspects and components; it has an impact on society and is impacted by society; it is the reason for certain phenomena and it is the outcome of others. It is important to determine, as much as possible whether it is deteriorating, stagnant, or improving.

Decisions relating to the quality of the education system must be based on a comprehensive and broad perspective that considers all of its functions and the potential effect it has on social processes. When this is done, it appears that the situation of the education system in Israel is not as bad as some think, and attempts to ignore its achievements and place blame on its workers, who are investing the best of their abilities in its success, is somewhat misguided.

This approach is mistaken first and foremost because the facts reflect otherwise. The current state of the education system is no worse or no better than in the past according to most of the parameters that were examined. Those parameters are the main ones that appear in the literature on assessing education systems. The rates of attendance in all stages of the education system have risen; the share of high school graduates and the share of them that graduate with a Bagrut certificate have also risen; the number of students per teacher and average class size have declined. Teachers today are more educated than in the past; the match between a teacher's training and the subject they teach has improved, as has the school environment, according to this survey. These processes have been accompanied by a narrowing of gaps between the Hebrew and the Arab education system and between schools of different socioeconomic levels on most of the variables considered above.

The view of the education system as being in decline and in an existential crisis is not only inaccurate but also dangerous because it may lead to feelings of despair and the hopeless conclusion that no matter what is done and no matter how much is invested, the results are dismal and investment is wasted.

In order to meet the oft-heard criticism of the education system, it is worth mentioning some additional achievements that have not been directly attributed to the education system but perhaps should be. For example, Israel's high tech industry, which employs a great number of young workers who have only just completed their education, is an achievement to be proud of. The brain drain from Israel — although it is a warning light for higher education in Israel — would not have occurred unless the owners of those *brains* had not

received their training in Israel's education system. (The problem could perhaps have been prevented to a large extent if graduates of higher education had more jobs available to them in institutions of higher education.) In addition, three of Israel's universities are almost consistently ranked among the top 100 worldwide and the rest are usually among the top 300. The education system in Israel has attained this level of achievement despite an ongoing security situation and far-reaching demographic changes, which have increased the share of weaker socioeconomic groups within the population.

It is worthwhile recognizing and praising the achievements of the system while being aware of its faults, which are substantial. It is important to increase efforts to improve academic achievement in all subjects. Every effort should be made to narrow academic and social gaps within the system, to halt the decline in the value of education and learning for its own sake; and to end the lack of respect for educational workers and especially teachers. It would also be worthwhile to mend the ever-widening gaps between the various parts of the system, to stop the decline in the study of liberal arts and the social sciences, and to rectify the lack of attention given to the sciences, mathematics, and English in the Haredi sector.

In recent years, we have been witness to growing polarization in discourse and sometimes even in behavior regarding relations between Jews and Arabs. Attempts to organize encounters between Arab and Jewish youth are few in number and not always successful in achieving their desired outcomes. Even discussions of relations between Mizrahim and Ashkenazim, secular and religious sometimes diverge from the discourse that is expected in an educational institution. Teachers are often fearful of expressing positions that are in line with the goals of education as set down in the Law of State Education and in the Declaration of Independence, and there is the blatant intervention of parents in what is happening in the schools. Finally, changes in government policy following the most recent elections, like freezing efforts to teach core subjects in Haredi education and encouraging activities of private educational institutions especially in the Haredi sector, place difficult challenges before the public education system.

We must demand from the education system leaders and from all those who are stakeholders, including teachers, principals, students, parents, and researchers, that they make improvements and increase efficiency, so that we will be able within the shortest time possible to achieve even better outcomes in academic achievement, in the narrowing of educational and social gaps, and in the learning and educational atmosphere in the schools.

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Appendix

Appendix Table 1. PISA exam scores: An international comparison

Reading literacy (Hebrew)

	2000	2009	2018	Difference 2018 to 2000	Difference 2018 to 2009
South Korea	525	539	514	-11	-25
Canada	534	524	520	-14	-4
New Zealand	529	521	506	-23	-15
Belgium	507	506	493	-14	-13
Switzerland	494	501	484	-10	-17
US	504	500	505	1	5
Sweden	516	497	506	-10	9
Germany	484	497	498	14	1
Ireland	527	496	518	-9	22
France	505	496	493	-12	-3
Denmark	497	495	501	4	6
Portugal	470	489	492	22	3
Latvia	458	784	479	21	-5
ISRAEL	452	474	470	18	-4
Russian Federation	462	467	479	17	12
Chile	410	449	452	42	3
Mexico	422	425	420	-2	-5
Indonesia	371	402	371	0	-31
ISRAEL'S rank	15	14	15	0	1

Appendix Table 1 (continued). PISA exam scores: An international comparison**Mathematics**

	2000	2009	2018	Difference 2018 to 2000	Difference 2018 to 2009
South Korea	547	546	526	-21	-20
Switzerland	529	534	515	-14	-19
Canada	533	527	512	-21	-15
Denmark	514	503	509	-5	6
Belgium	520	515	508	-12	-7
Sweden	510	494	502	-8	8
Germany	490	513	500	10	-13
Ireland	503	487	500	-3	13
Latvia	463	482	496	33	14
France	517	497	495	-22	-2
New Zealand	537	519	494	-43	-25
Portugal	454	487	492	38	5
Russian Federation	478	469	488	10	19
US	493	487	478	-15	-9
ISRAEL	433	447	463	30	16
Chile	384	421	417	33	-4
Mexico	387	419	409	22	-10
Indonesia	367	371	379	12	8
ISRAEL'S rank	15	15	15	0	0

Appendix Table 1 (continued). PISA exam scores: An international comparison**Science**

	2000	2009	2018	Difference 2018 to 2000	Difference 2018 to 2009
South Korea	552	538	519	-33	-19
Canada	529	529	518	-11	-11
New Zealand	528	532	508	-20	-24
Germany	487	520	503	16	-17
US	499	502	502	3	0
Belgium	496	507	499	3	-8
Sweden	512	495	499	-13	4
Ireland	513	508	496	-17	-12
Switzerland	496	517	495	-1	-22
Denmark	481	499	493	12	-6
France	500	498	493	-7	-5
Portugal	459	493	492	33	-1
Latvia	460	494	487	27	-7
Russian Federation	460	473	478	18	5
ISRAEL	434	455	462	28	7
Chile	415	447	444	29	-3
Mexico	422	416	419	-3	3
Indonesia	393	383	396	3	13
ISRAEL'S rank	15	15	15	0	0

Note: The comparison is between the scores of Israeli students and those of students from the participating countries in each exam.

Source: Nachum Blass, Taub Center | Data: RAMA, international studies

Appendix Table 2. TIMSS exam scores: An international comparison**Mathematics**

	1999	2011	2019	Difference 2010 to 1999	Difference 2019 to 2011
Australia	525	505	517	-8	12
Hong Kong	582	586	578	-4	-8
Hungary	532	808	517	-15	12
Iran	422	415	446	24	31
ISRAEL	466	477	519	53	42
Italy	479	485	497	18	12
Japan	579	578	594	15	16
Jordan	428	406	420	-8	14
South Korea	587	613	607	20	-6
Lithuania	482	502	520	38	18
Malaysia	519	440	461	-58	21
Morocco	337	371	388	51	17
Romania	472	458	479	7	21
Russian Federation	526	539	543	17	4
Singapore	604	611	616	12	5
Slovenia	530	510	511	-19	1
ISRAEL'S rank	13	11	7	-6	-4

Appendix Table 2 (continued). TIMSS exam scores: An international comparison

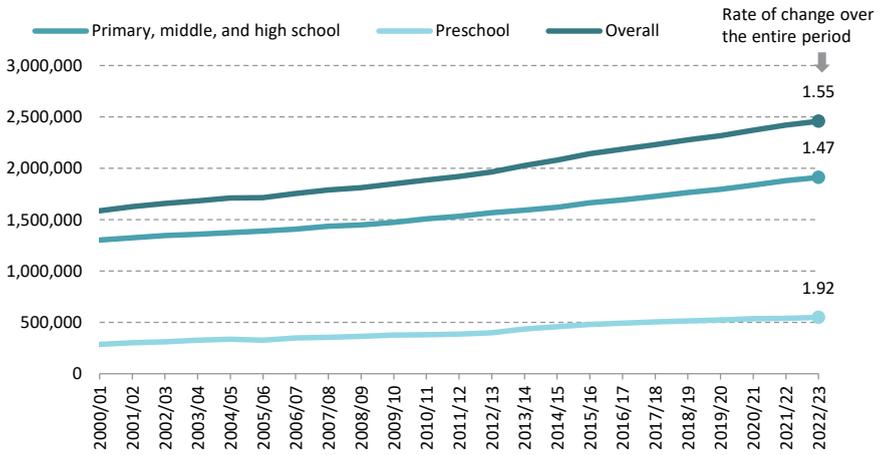
Science

	1999	2011	2019	Difference 2010 to 1999	Difference 2019 to 2011
Australia	540	519	528	-12	9
Hong Kong	530	535	504	-26	-31
Hungary	552	539	530	-22	-9
Iran	448	474	449	1	-25
ISRAEL	468	503	513	45	10
Italy	493	494	500	7	6
Japan	550	566	570	20	4
Jordan	450	449	452	2	3
South Korea	549	560	561	12	1
Lithuania	488	514	534	46	20
Malaysia	492	426	460	-32	34
Morocco	323	376	3984	71	18
Romania	472	465	470	-2	5
Russian Federation	529	542	543	14	1
Singapore	568	590	608	10	18
Slovenia	533	517	543	10	26
ISRAEL'S rank	13	10	9	-4	-1

Note: The comparison is between the scores of Israeli students and those of students from the participating countries in each exam.

Source: Nachum Blass, Taub Center | Data: RAMA, international studies

Appendix Figure 1. The number of students in the Israeli education system



Source: Nachum Blass, Taub Center | Data: Ministry of Education

