

**TAU Research Alliance in Education**  
**Report No. 1**  
**December 2018**

**Audrey Addi-Racah and Yarden Sal-man**

**Objectives**

This report focuses on the first stage of the project "TAU interdisciplinary centre for education reform". This stage includes: 1. Preparing data files addressing all high schools in Israel.

2. Describing the Israeli school system with a focus on high schools matriculation achievements as measured by the percentage of students who are eligible for matriculation certificate and matriculation certificate with five math units (hereafter-percentage of students that were tested for five math units). We focus on these achievements due their attributed importance to the matriculation certificate for individual future prospects.

3. Comparing between the different educational systems and levels of school socio-economic (SES).

4. Identifying and characterising schools that improved their achieved over time.

This report includes six parts. The first one, provides a brief description of the Israeli educational system. The second part, present the construction of the data files. In part 3, we address to an overview of high schools in the Israeli educational system. Part 4, focuses on school's achievements, in terms of percentage of student eligible for matriculation certificate and the percentage of students who were tested for five math units. Part 5, looks at school improvement over time and in part 6, we present several preliminary conclusions.

## **Part 1: Israeli educational system - A brief introduction<sup>1</sup>**

The K12 educational system in Israel serves all the children and adolescents between the age of three to eighteen (age of completion of 12<sup>th</sup> grade) (Compulsory Education Law and State Education Law, Ministry of education, 2018). Since the establishment of the state, parents were allowed to choose the educational system in which their children would learn. In practice, schools are divided first by their language of instruction—Hebrew (75%) in the Jewish sector and Arabic (25%) in the Arab sector. Within each sector, schools are divided by supervisions that address and represent different cultural and religious preference. The Jewish schools are divided to three different supervisions - the secular, religious, and Ultra-Orthodox. In the Arab sector there are separate supervisory bodies for the Arab, Bedouin, and Druze. Under each supervision, the curriculum has different content and a different proportion of religious and cultural studies that are designed to fit the relevant population characteristics.

Although this diversity, the Israeli education system is relatively centralized under the supervision of the Ministry of Education, which allocates resources, determines the national curricula and set and implements national wide educational policies including testing policies. For many years, education policymakers have wrestled with the issues of segregation in the education system alongside the attempt to narrow social and achievement gaps.

This occur since in 1948, when Israel was founded. At that time, the education system was formed as a public system of education, characterized by centralization and broad government supervision (Ichilov, 2010), as part of the “melting pot” that would shape and develop the pupils’ identification with the state’s values and Israeli culture, and integrate the diverse groups of immigrants that arrived during the 50 and 60’s. To cope with social gaps the ministry of education implemented in 1968 an integration reform, with a demand for ethnically heterogeneous learning frameworks as a strategy of narrowing the achievement gap and strengthening social integration by actively changing the social composition of schools (Resh & Dar, 2012). This policy was gradually implemented in many localities until the mid-90s (Chen & Addi, 1995) and boosted the status of local authorities in determining local education policy and created a diversity among localities in the structure and resources of the education system (Addi-Raccah et al., 2015).

At the same time there were growing trends of decentralization, that worked against integration and increased diversity in the education system. This trend led to school autonomy encouragement (1985-1992) and the appearance of school networks with an ethnic character (in the 1980s and 1990s), as well as special schools (1988-1989) (Dror, 2011; Raichel, 2008). The diversification of the education system reflects the Ministry of Education’s response to the wishes of the parents not to send their children to heterogeneous schools and to political and religious

---

<sup>1</sup> Adapted from: Addi-Raccah, A., Grinshtain, Y. & Bahak, H. (2015). *Trends of segregation or integration in the residential environment based on socio-economic status of pupils in the school*. Initiative for Applied Education Research, Israel Academy of Sciences and Humanities.

pressure groups that wished to provide education that is consistent with their worldview. As a result, the integration as a central strategy for narrowing gaps ended in the 1990s (Gibton, 2004; Kizel, 2011).

Since 1990s, Neo-liberal views have taken root in the Israeli education, emphasizing the development of the individual and his or her abilities, by developing enrichment programs for outstanding pupils. The neo-liberal approach, which seeks efficiency in achieving educational output, views the school as the significant unit for educational action and regards the school's staff as the primary agent for promoting and improving the achievements of all school's pupils. It gave way to a policy of decentralization that emphasizes processes related to the school's autonomy and self-management, choice of schools, and privatization trends, allowing space for parental involvement and wide diversity in the education system (Addi-Racah & Einhorn, 2009; Gibton, 2011; Gofen & Blomqvist, 2014; Volansky, 2006; Noy, 2014).

In that regard Committees that studied trans-regional schools, special oriented schools and controlled choice of schools in the 1990s and early 2000s found great variance among schools and growing trends of class-based separation (Inbar 1994 in Almog-Barkat & Inbar, 2010; Knaani & Shilhav, 2001).

In 2008, the trends of separation based on sector was further entrenched due to enactment of the Unique Cultural Education Institutions Law, which enabled Ultra-Orthodox sector to operate in the educational system independent programs that are not subject to the core curriculum. By that sectoral separation was reinforced and the diversity in the education system grew (Gibton, 2010). Current research of Israeli educational system shows that diversity regarding differences between the educational systems remains significant.

In the efforts to reduce existing social, mainly SES, gaps in student achievement, the government's aim is to enhance social disadvantage areas and populations, by increasing educational budgets at the school level, as part of the decentralization trend. The government invests many recourses in education (the education budget is usually the second highest of all other budgets, after defense) that at 2018 reached a peak as the highest of all budgets. Still, when comparing Israel's education investments to average budget investments per student in countries of the OECD, Israel falls behind significantly and is one of the lowest budget per student in the OECD (OECD, 2018a, 2018b; MOF, 2018, 2016; MOE, 2007).

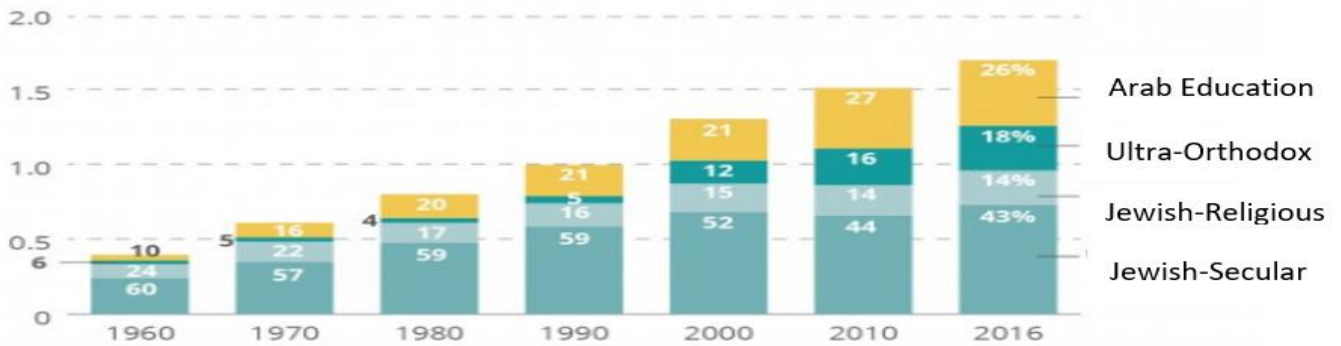
More initiatives that took place in recent years concentrated mainly on two domains. First, there are additional efforts toward school decentralization which included initiatives for encouraging greater school autonomy, expansion of parents' school choice and increasing competition between schools. Secondly, there had been great emphasis on improving education learning programs and examination processes, such as implementing the "Significant Learning" program and "Give Five" math studies policy (OECD, 2018a, 2018b). The "Significant Learning" program, was implemented

at the end of 2014 (and is still taking place) aiming to nurture and develop 21 century skills among students, adapt the system to different students' need, increase learning achievements, encourage students' involvement in school and the community and develop learning exultation alongside emotional, social and cognitive experiences. The "Give Five" math policy was implemented in 2015, in order to increase significantly the number of students that study advanced math and get tested at five math units in the matriculation exams, increase the number of math teachers, improve instruction methods and the quality of math teaching and promote innovative and unique advanced math learning programs (MOE, 2014a, 2014b, 2015). Effort had been also put to increase the inclusion of Ultra-Orthodox schools into the mainstream education by learning core curriculum and participating in matriculation exams.

On the overall, educational policy in Israel underwent ideological changes that is the transition from a centralized system to a decentralized one. That change includes a strategic change- from social integration as a means of fostering weak groups and narrowing gaps, to a focus on the school as the central unit for educational action. Secondly, education policy in Israel is cumulative: A new policy was added to its previous instead of replacing it (Gibton, 2010). And there are more experimental projects than reforms that encompass the entire system. Thirdly, the discussion on gaps in school achievements shifted from ethnic inequality to class inequality (Dahan, 2013) and with inequality based on nationalism and religious (Jewish or Arab), that had existed since the establishment of Israel. Finally, education policies are based on a very limited number of comprehensive and systematic laws that are not up-to-date (Gibton, 2010), which leave more space for local initiatives and diversity. The result of these processes is wide diversity in the types of schools and the activities conducted in them, that may also rise the social segregation in Israeli society and its education system (Tamir, 2015). Currently, there is a broad space for bottom up actions (involvement NGOs, local authorities or parents initiatives and more) that create complex relations between diverse stakeholders. Still these challenges have to be contextualized with the major four educational systems that are becoming more balance in their size, as presented in Figure 1 (adapted from Weiss, 2017).

Figure 1: The distribution of students by educational systems from 1960 to 2016

Number (in Millions)



## Part 2: Data Organization

The education system consists of three levels: preprimary education (ages 3 to 6); elementary education (kindergarten to mainly Grade 6; yet 25% of elementary schools offer eight years of education), and secondary education, which includes lower secondary education (Grades 7 to 9) and upper secondary (senior high) education (Grades 10 to 12) (Mullis, Martin, Goh & Cotter, 2016). About half (50%) of the schools who have 12<sup>th</sup> grade class are from 7 to 12 grade.

At high school (10<sup>th</sup>-12<sup>th</sup> grade) students are expected to take official matriculation exams (referred to as “Bagrut” tests). The matriculation exams include several mandatory exams, including Bible studies, Hebrew writing and grammar, English as a second language, civics, history, mathematics. Mandatory subjects change slightly between sectors (supervisions). The examinations are given on different levels (usually from 1-lowest to 5-highest units). Students can take additional exams in other subjects if they chose and if their school is able to provide such curriculum (Mullis et al., 2016). Gaining a matriculation certificate, is a prerequisite for higher education. Almost all schools provide their students the opportunity to take the matriculation exams, as presented in the Table 1.

Table 1: Percentage of schools that submitted students to matriculation exams by educational system and year (2014-2017)<sup>2</sup>.

Educational system\ year	2014	2015	2016	2017
Jewish -Secular	99.7%	99.5%	99.5%	99.5%
Jewish Religious	100%	100%	100%	99.6%
Ultra-Orthodox	53%	50.6%	51.1%	51.2%

<sup>2</sup> Based on official data of the Ministry of Education.

Arab	99.5%	100%	100%	100%
Total	86.5%	85%	85%	84.8%

An exception is the Ultra-Orthodox sector in which only half of the schools (51.2% for 2017) enable to take the matriculation test.

In view of the importance attached to the matriculation certificate, our data were focused on 12<sup>th</sup> grade achievements in matriculation exams. At this stage, we organize and match five types of data files from different sources for each of the following years 2013-2017: 1. Schools characteristics; 2. Matriculation eligibility; 3. Matriculation units and scores; 4. Schools SES file and 5. Students background file. The matching of the data was based on school ID and/or student ID. Based on these files two large sets of data were computed:

1. **Schools:** 4967 high school between 2014-2017 (about 1200 school per year). This data set was prepare based on “*Transparency in Education*” a web site published by the Ministry of Education. These are public data. The present report was based on these data.
2. **Students:** 12<sup>th</sup> grader was attach to their prior achievement when being in 5<sup>th</sup> grade and 8<sup>th</sup> grades, and to their current matriculation achievements. In addition, school characteristics were attach to each student. This file contains 589,977 students for years 2013-2017 (about 117,000 students per year). In contrast to the school file (presented at #1), these data are anonymous, and located at the Ministry of Education remote research room.

In addition, we started to work on school climate variables. However, this still need to be done and constructed (this is part of phase two, as planned).

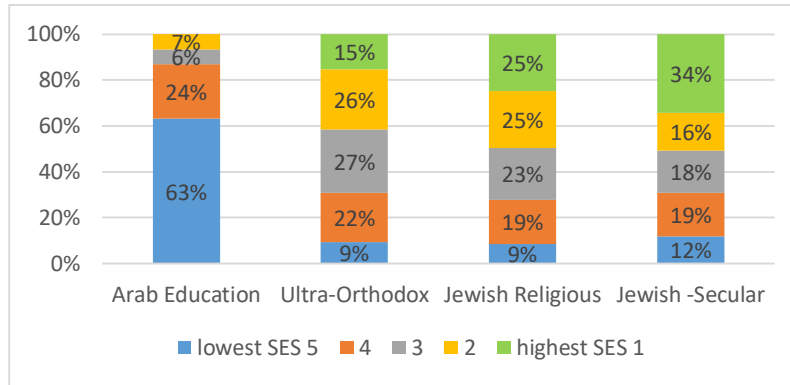
Hereby an introduction and data analyses of the first stage. In this phase we were interested in observing achievements at the school level and change trajectories during 2014-2017 while comparing between different school SES and educational systems.

### **Part 3: An overview of high schools in the Israeli educational system**

The Israeli educational system encompass about 1,100 high schools. About 36.7% are affiliated to the Jewish-Secular education; 25.7% are Jewish-Religious; 18.0% are Ultra-Orthodox schools and 19.6% are affiliated to the Arab education.

Figure 2, presents that there are difference between the four educational systems in the SES composition of their schools.

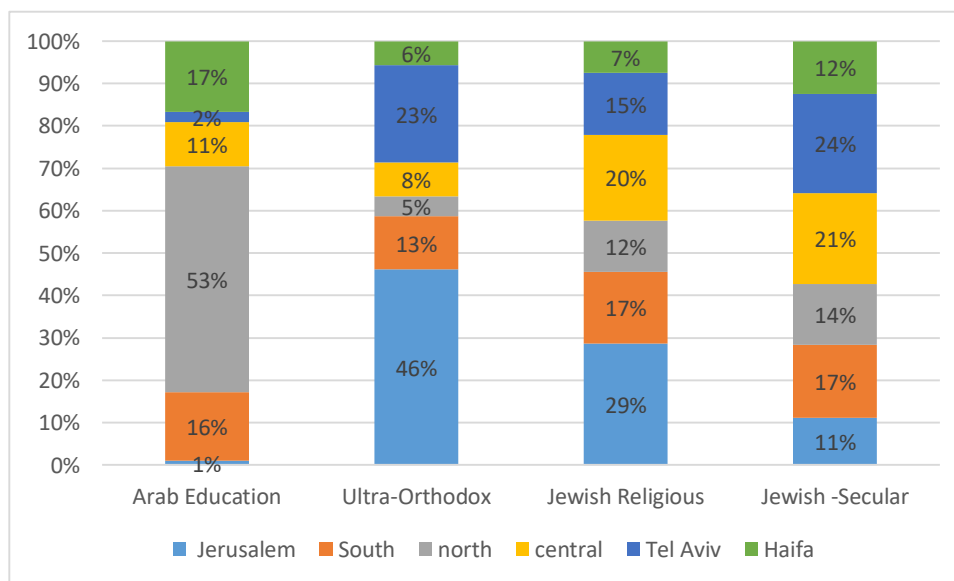
Figure 2: School SES distribution by the four educational systems in 2017 (in percentage)



Jewish-secular education has the highest percentage of high SES schools (34% level 1, top 20% in SES), while the Arab education has the highest percentage of low SES schools (63% of level 1, bottom 20% in SES). In the Arab school there are any high SES school. The Ultra-orthodox and Jewish- religious schools fall in- between, with a relatively low percentage high SES schools (15% and 25%).

Figure 3 shows that the four educational system are concentrated in different geographical areas. Most of the Arab schools are located in the North (53%) and to a less extent in Haifa or the South. The Ultra-Orthodox schools are located in Jerusalem area, whereas the Jewish secular and Jewish religious schools are more disperse across the state. Thus, the Arab and the Ultra-Orthodox schools tend to be highly spatial segregated.

Figure 3: Districts distribution by educational systems in 2017 (in percentage)



#### Part 4: Schools' achievements

While addressing to high schools, two main questions directed data analyses:

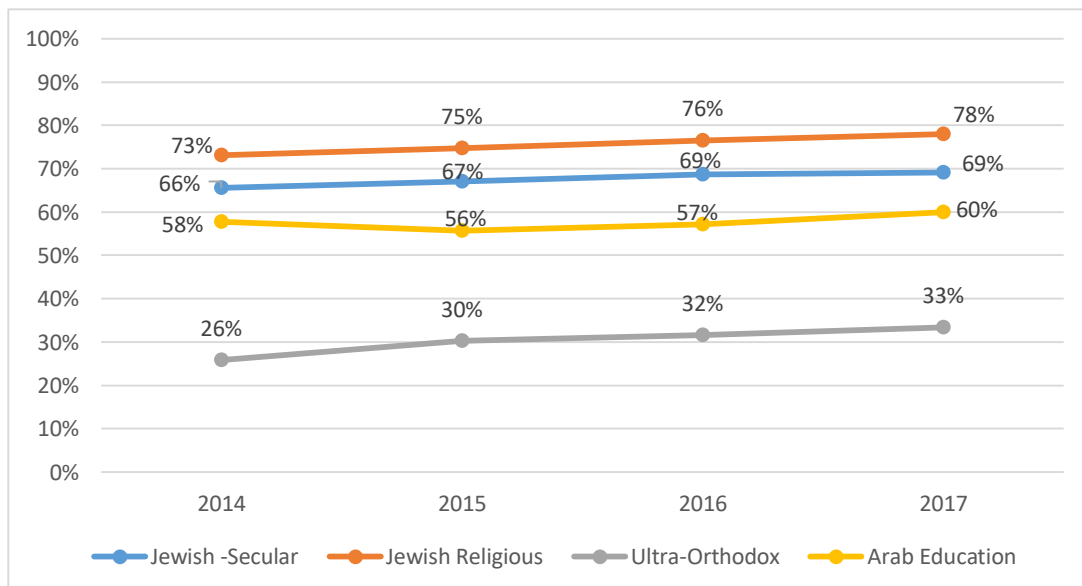
1. Are there over time changes in school matriculation achievement, i.e. percentage of students eligible for matriculation certificate and percentage who gain five Math units?
2. Are there differences between the four school systems and schools SES in overtime changes in matriculation achievement?

While examining the matriculation achievement, only schools who submit their students to the matriculation exams were analyzed (this encompass 85% of all schools), as these school had all data for the years 2014-2017.

##### A. Eligibly for matriculation diploma

Figure 4 presents the average school percentage of students eligible for matriculation certificated by educational system in the years 2014 and 2017. It is clear, that there is a steady increase in the percentage of students who are eligible to matriculate certificate in each educational system. The most prominent increase occurred in the Ultra-Orthodox sector. Yet recall that only a half of the schools afford their students to take the matriculation exams. In the Jewish-religious school we also see an increase. These schools, on average, gain in 2017 the highest percentage of students who get a matriculation certificate (78%). Jewish-secular schools achieve less than the Jewish-religious schools but they do on average better than Arab schools.

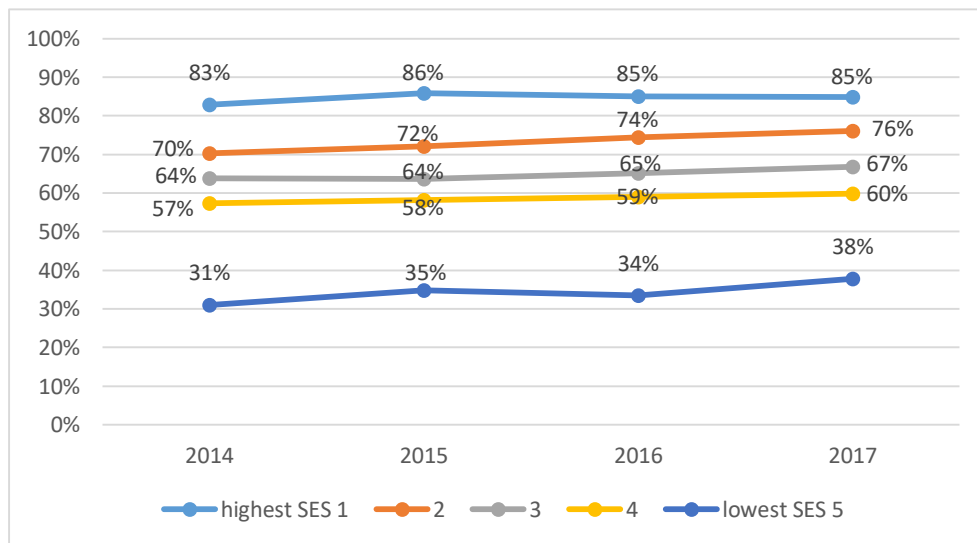
Figure 4: Average school percentage of students who are eligible for matriculation certificate, by educational system between 2014-2017.





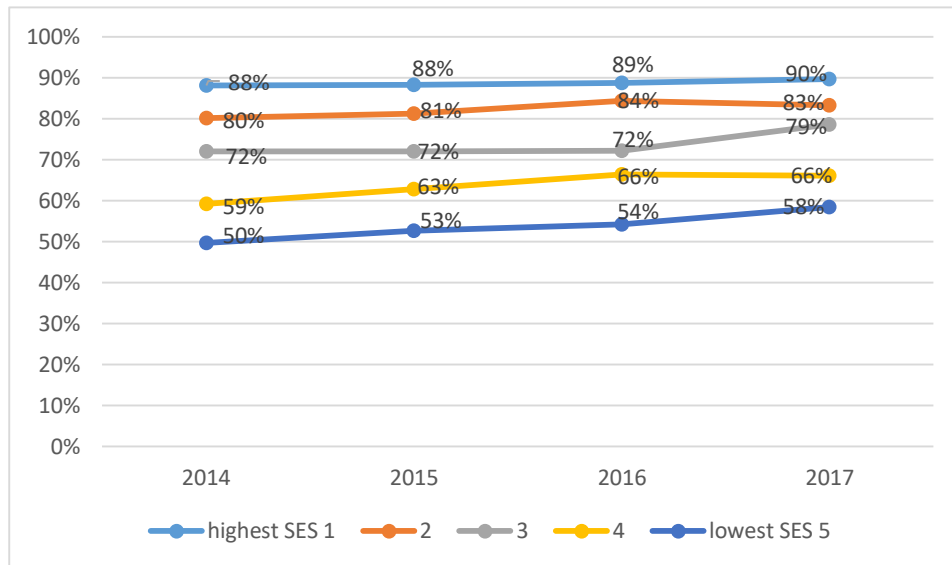
While focusing on each educational system (Figures 5-8), we can learn that there are differences in the average percentage of students eligible for matriculation certificate by school SES. For each year, in high SES schools, the percentage of students in school who gain a matriculation certificate is higher than in low SES schools. The gap between high and low SES schools remain quite large between 2014-2017. This is so in each educational-system, except for the Ultra-Orthodox (Figure 7).

Figure 5: School average percentage of students eligible for matriculation certificate by SES in the Jewish -secular educational system between 2014-2017.



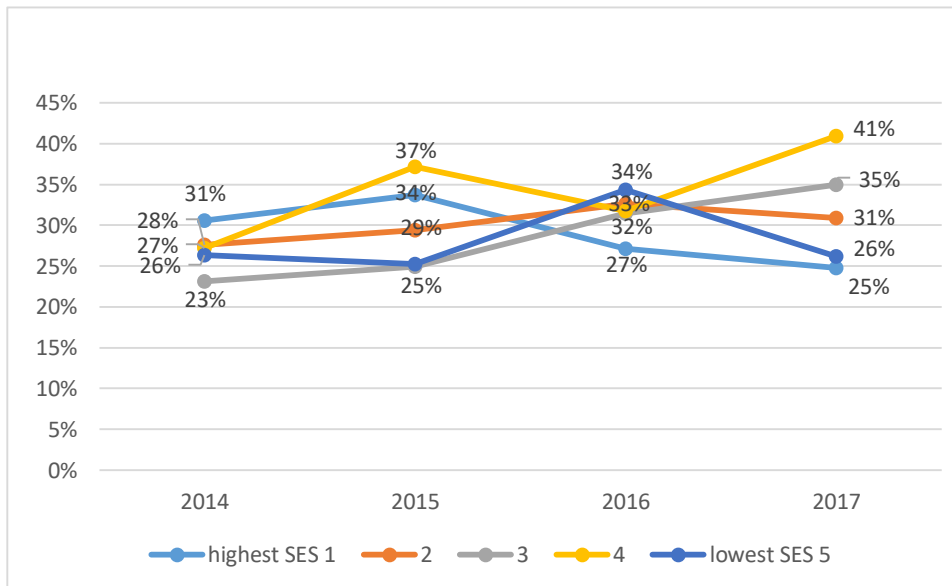
Although similar trend occurred in the Jewish secular and religious schools, in the former, low SES schools are less eligible for matriculation certificate than low SES schools in the Jewish religious schools ( see Figure 4 compared to Figure 5).

Figure 6: School average percentage of students eligible for matriculation certificate by SES in the Jewish-Religious educational system between 2014-2017.



Furthermore, in the Jewish-religious schools, the SES gap is narrower compare to the Jewish-secular educational system (32% compared to 47% for 2017).

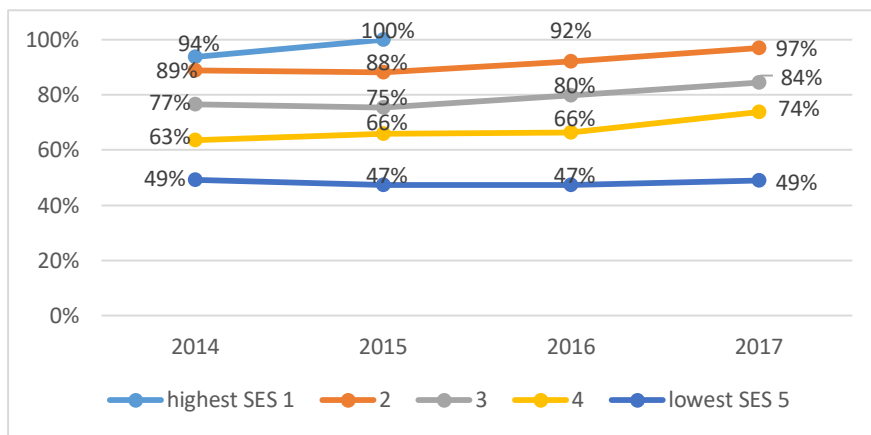
Figure 7: School average percentage of students eligible for matriculation certificate by SES in the Ultra-Orthodox educational system between 2014-2017.



In the Ultra-Orthodox (Figure 7), between 2014-2017, the SES differences between schools are not consistent. This may hint about the complex changes that this educational system undergoes, that still need to be prob.

As for Arab schools, presented in Figure 8, in high SES schools (level 1 and 2) the percentage of students eligible for matriculation certificate is higher than low SES schools (level 5). However, contrary to the Jewish secular and religious schools, over the year the school SES gap is increasing, mainly due to the increase in the percentage of students eligible for matriculation in high SES schools and a stagnation in low SES schools.

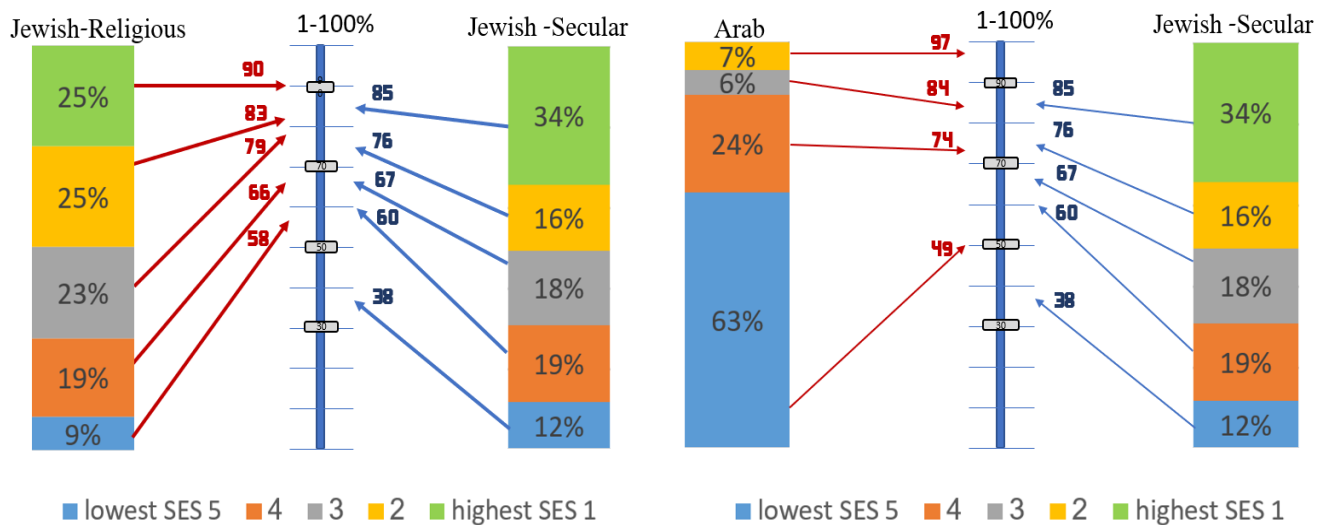
Figure 8: School average percentage of students eligible for matriculation certificate by SES in the Arab educational system between 2014-2017.



In the Arab education compared to the three other Jewish educational systems, the percentage of students who are eligible for matriculation exams in high SES schools, is the highest (in both level 1 and 2). While controlling for school SES, we can see that the Jewish-religious and Arab schools are doing better than Jewish- secular schools in the percentage of

students eligible for matriculation certificates. A strong illustration of these trends are presented in Figure 9, referring to 2017.

Figure 9: The average percentage of students in school who are eligible for matriculation certificate by school SES and educational system at 2017.



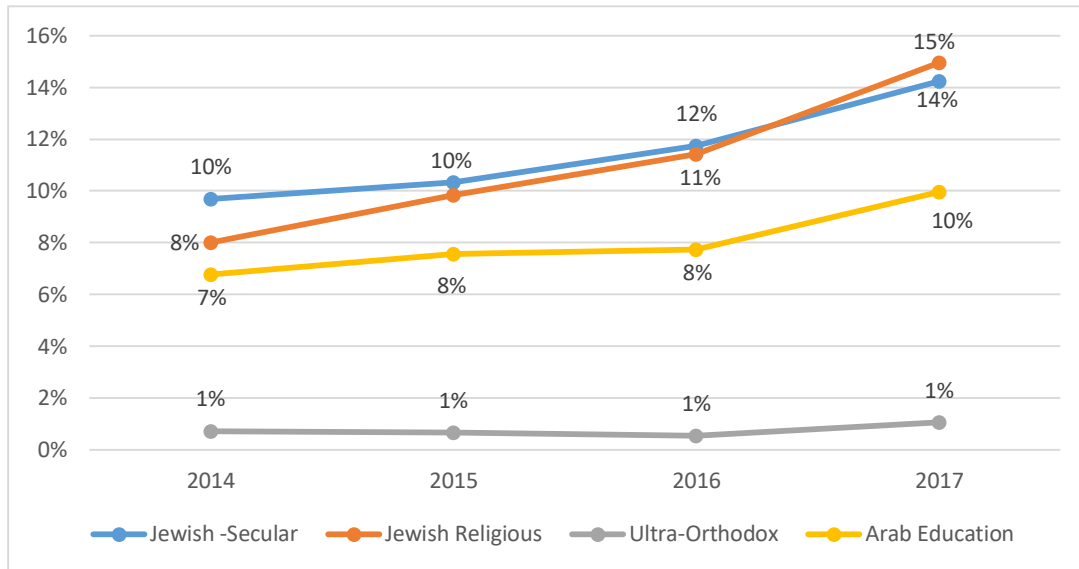
From Figure 9, it appears that for similar level of SES, Arab as well as Jewish-religious schools are doing better than the Jewish-secular schools. For example, in mid SES school (level 3), in the Jewish-secular education the school average percentage of students eligible for matriculation certificate is 60%; in Jewish-religious schools is 79% and in Arab education 84%. While on the overall Arab schools may have lower percentage of students eligible for matriculation certificate, part of these lower achievements are related to over-representation of low SES schools. This is less prominent while comparing between Jewish religious and Jewish secular schools.

To conclude this part, we learn that over time there are difference in the percentage of students eligible for matriculation certificate between the four educational systems and the patterns of schools' SES gaps within each educational system.

### B. Five math units matriculation

While addressing to five math units, which are considering to be hard to achieve and mainly characterized high performing students, some different patterns were found in comparison to the eligibility of matriculation certificate.

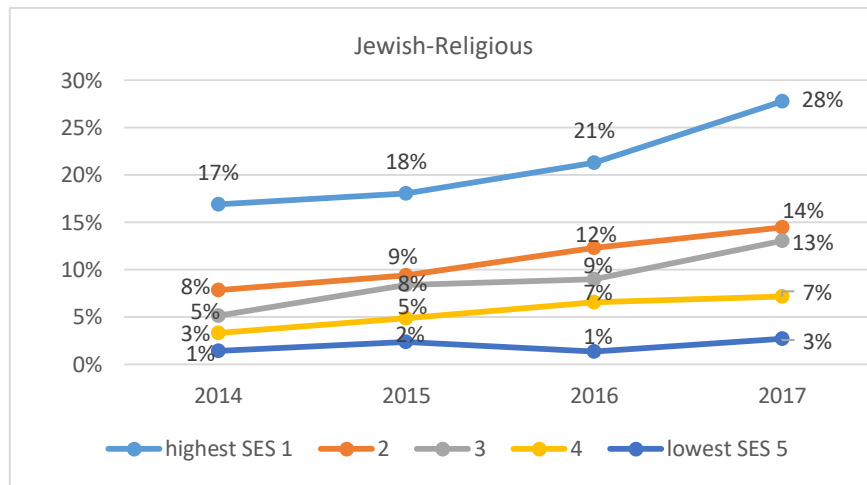
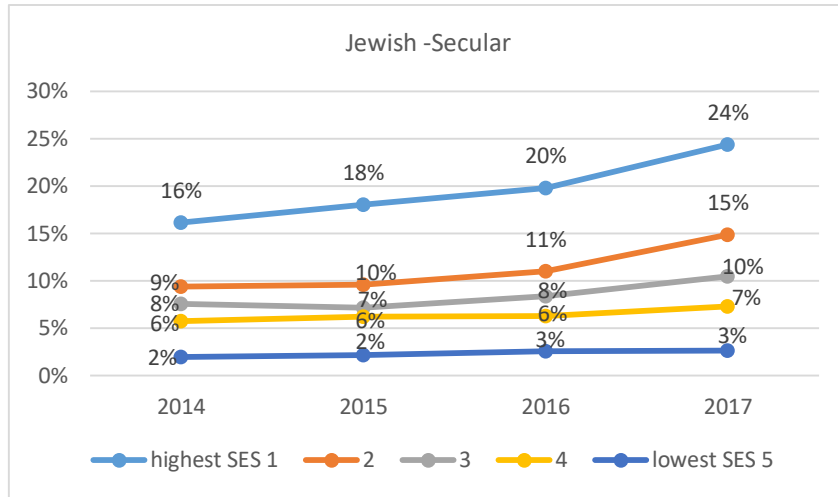
Figure 10: Over-time difference in average percentage of students that were tested for five math units in schools by educational system, between 2014-2017.

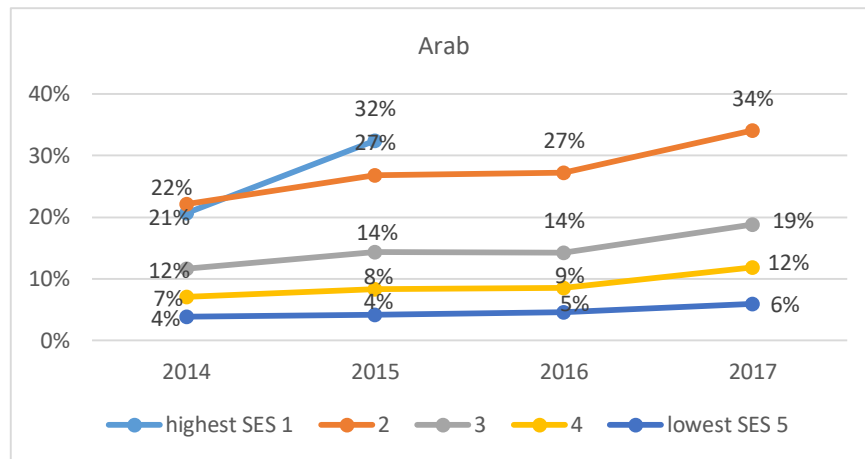


From Figure 10, we can learn that there is a similarity between Jewish-secular and Jewish-religious schools in the percentage of students who were tested for five math units. In both educational systems there is an increase over time, particularly for 2017. This may reflect the 2015 five math units policy implemented by the Mr. N. Benet, the Minister of Education. In the Arab sector, the average school percentage of students who were tested for five math units is lower and its increase is less than in the Jewish schools. In the ultra-orthodox schools, the percentages are very low (1%).

We also examine difference between schools SES in each educational system in regard to the percentage of students who were tested for five math units. In general, similar trends were found as for matriculation certificate (see Figures 5,6 and 8). That is high SES schools have on average a higher percentage of students who were tested for advance math courses than low SES schools. Except for the fact that there was a considerable and steeper increase in the percentage of students in school who were tested for five math units in high SES schools in 2017 (see Figure 11 for the three educational system). We can suggest that the new "Give Five" math policy was implemented by school principals more intensively in high SES schools. This is reflected in the Arab sector, in which, we disclose that while taking into consideration school SES, Arab education reach higher average achievements, particularly in high SES schools (level 2) in which in 2017, 34% of the students took five math units, the parallel figures(for SES level 2) in the Jewish education are around 15%.

Figure 11: Percentage of students that were tested for five math units in three educational systems between 2014-2017





In the current analyses we did not refer to the Ultra-Orthodox schools as the overall percentage of students who were tested for five math units was very low (less than 2%).

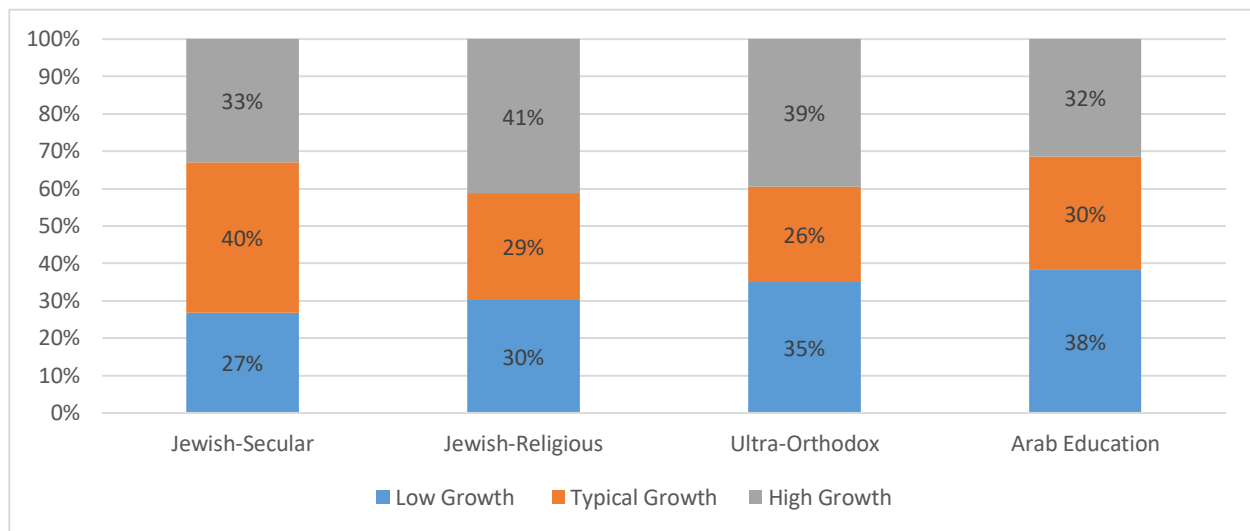
## Part 5: Improvement over time

### A. Matriculation certificate

In this part we examine *School Growth Percentiles (SGP)*, between 2014-2017. In these data analyses, the base line was the average percentages of students eligible for matriculation certificate in 2014-2015. These percentages were grouped into 20 categories, each comprising 5%. Within each group, schools were ranked by their average percentage of students eligible for matriculation certificate in 2016-2017, and their percentiles were computed. This allowed to examine school improvement in comparison to other schools with *prior similar achievements*. Schools that fall between 1-33% were define as low growth, between 34-66% as ‘typical growth’ and between 67-99% as ‘high growth’<sup>3</sup>. Figure 12 presents the distribution of schools by their SGP and educational system.

Figure 12: School distribution by the extent of their improvement in the percentage of students eligible for matriculation certificate in each educational system (2014-2017)

<sup>3</sup> <http://www.k12.wa.us/assessment/studentgrowth.aspx>

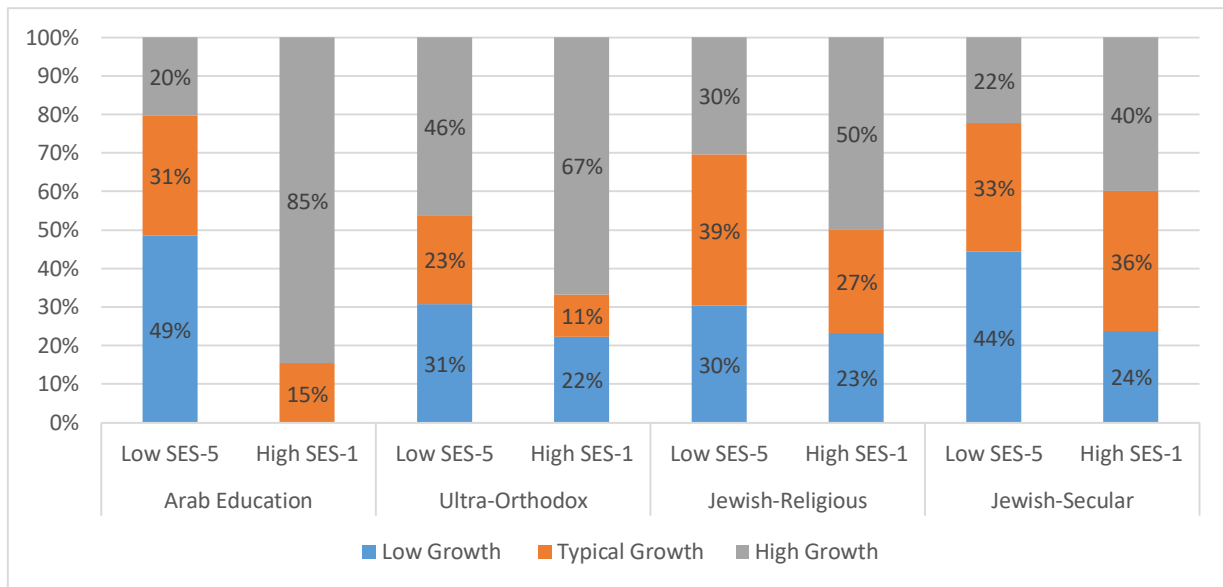


The findings presented in Figure 12 indicated that in Jewish-religious and Ultra-Orthodox school systems, there is a relative high percentage of school who improved their matriculation achievements, in term of being eligible to matriculation (41% and 39%). In Arab education, high growth schools were as similar to the Jewish-secular school. However in the Arab education there is a relatively high percentage of schools that their improvement was low (38% compare to 27% schools that were defined as low growth).

Examining the SGP by school SES, reveal that in each educational system, high growth were found in high SES schools, while low growth characterized low SES schools (see Figure 13). The differences between these school is very prominent in the Arab education (85% high growth school compared to 20% in low SES schools). This findings go along the increase in SES gap in the Arab sector. That is high SES school tend to be more effective than low SES schools. These differences are less prominent in the Jewish education.



Figure 13: School distribution by the extent of their improvement in the percentage of students eligible for matriculation certificate by school SES in each educational system (2014-2017)



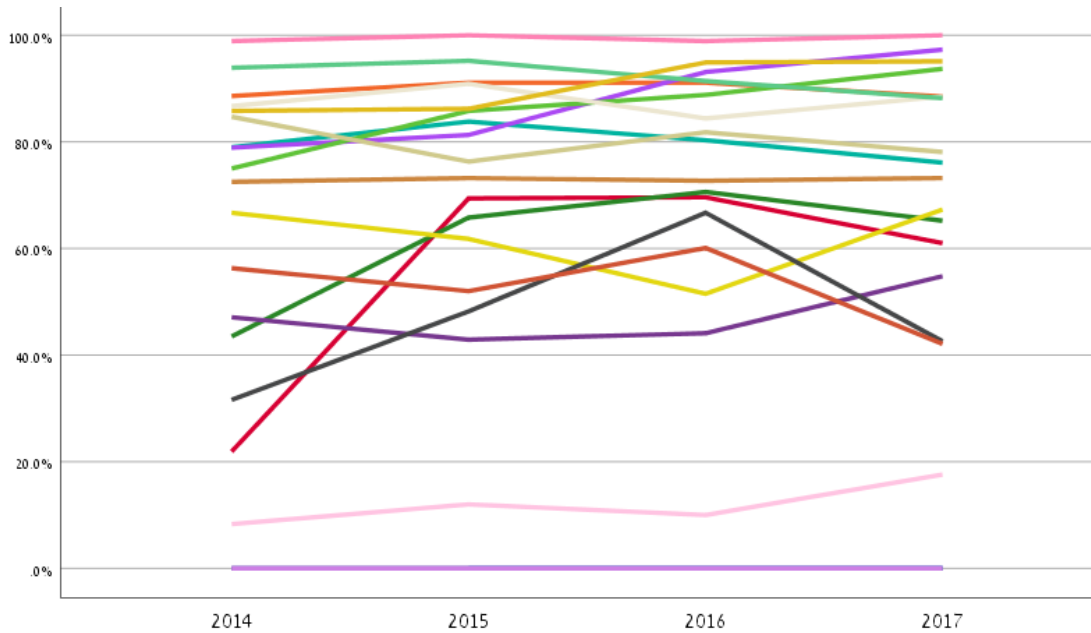
**B. Changes in each school achievements between 2014-1017: Matriculation certificate**

Over time changes in school matriculation eligibility, demand us to probe if there is a diversity in the patterns of change. That is, we need to look whether the school's changes across time is linear or whether it might be more complex. Next, we had to examine whether the patterns of over time change are divers across schools. That is whether the time factor affect the percentage of eligibility for matriculation certificate to a different extended across schools. Once we have described the shape of school's change trajectories over time, and examine their variability across schools, we focus on examining whether school attribute (e.g. SES, educational system) are related with schools' differences in overtime changes. In explaining school's over time changes we wish to adjust our estimates after controlling for covariates that might be related with these changes, as school size, percentage of students who gain testing adjustments or the characteristics of the teaching forces. The data includes four observations per school on each measure of matriculation achievements (certificate legibility or five math units) that are repeated for each time interval. The dependent variable, percentage eligible for matriculation certificate and five math units, respectively, represents each school's scores on the repeated measurements.

In Figure 14, we first focus on school's changes in eligibility for matriculation certificate over time. This figure refers to a small representative school sample. We can see that there is a diversity between schools in the patterns of trajectories between 2014 and 2017. Part of them

are linear other quadric. Through model 2 (in Table 2 below) we examine whether this diversity is significant.

Figure 14: The trend of change in school percentage of students eligible for matriculation certificate between 2014-2017 (an exemplify random sample of schools)



### C. The models for predicating school percentage in matriculation certificate

In this part we aim to predicate over time changes in school matriculation eligibility. For that purpose, mixed-model with longitudinal data (repeated measure) was employed. In these analyses we examine whether the time variable (2014 to 2017) had a significant impact on schools' matriculation eligibility changes and to characterized the variables that are associated which these changes. First we examine a null model (Model 1). In this model, we included only the percentage of students eligible for matriculation certificate. We could learn that there is a variance between schools in the percentage of students eligible for matriculation certificate. On the overall, during 2014-2017, on average, 59% of the students in high school were eligible for matriculation certificate.

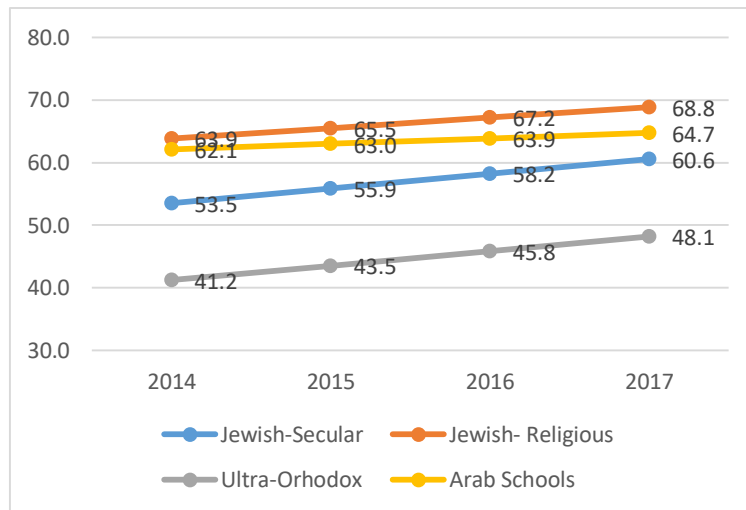
In Model 2, time variable was included. First, we examine the shape of the changes over time in the percentage of students eligible for matriculation certificate. It was found that only the linear trend was significant. Hence, time was included in the analysis as a linear effect while also allowing the time variable to vary across schools as significant differences were found between schools in the time effect on school percentage of students eligible for matriculation certificates (variance of 10.70907). It was also found that there is an increase over time in schools' percentage of students eligible for matriculation certificate, by an average of 1.511% each year.

Table 2: Result of mixed model for longitudinal data for predicting school percentage of students eligible for matriculation certificate between 2014-2017

	<b>Model 1</b>	<b>Model 2</b>	<b>Model 4</b>
	<b>Estimate</b>	<b>Estimate</b>	<b>Estimate</b>
Intercept	59.011*	56.611*	50.185*
time		1.511*	2.847*
School SES			-8.524*
time * School SES			0.353
Arab education			8.619*
Jewish-religious			10.365*
Ultra-Orthodox			-12.308*
Jewish-secular			
Arab education*time			-1.499*
Jewish-religious*time			-0.708
Ultra-Orthodox*time			-0.048
Jewish-secular*time			
School size			1.956*
Size*time			-0.425**
Regular school			3.316*
Special school			
Regular school*time			-0.482
Special school*time			
Percent of MA teachers			3.457*
Percent of MA teachers*time			0.025
Teachers' median of years of seniority			0.960
Teachers' median of years of seniority*time			-0.581*
6 years high-School			11.198*
4-years high-School			-2.448
3-years high school			
6 years high-School*time			-0.835
4-years high-School*time			-0.591
3-years high school*time			
<b>Variance components</b>			
Repeated measures	81.14227	59.93668	64.67129
Intercept	1110.354	1173.555	581.3159
Intercept X Time		-26.2019	-12.691
Time		10.70907	9.937832

Model 3, include several school predictors revealing that high SES schools have high percentages of students who are eligible for matriculation certificate compared to low SES schools. However, low SES schools demonstrate more growth over time compared with high SES schools. It was also found that after controlling for school SES and several organizational characteristics (see Appendix 1), Arab schools have higher rate of students who are eligible for matriculation certificate, however, in these school the percentage of students eligible for matriculation certificate decrease over time more than in the secular-Jewish schools. That is, over time schools in the Jewish- secular school seem to improve more than schools in other educational systems. Further, on the overall, Ultra-Orthodox school seem to do less well than the other educational system. These patterns are presented in Figure 15.

Figure 15: The predicted percentage of students eligible for matriculation certificate in an average school by educational system<sup>4</sup>



In addition, in Table 2, the findings showed that large schools have a less over time growth in the percentage of students eligible for matriculation certificate than smaller schools. So is the case for schools with teachers with high level of seniority.

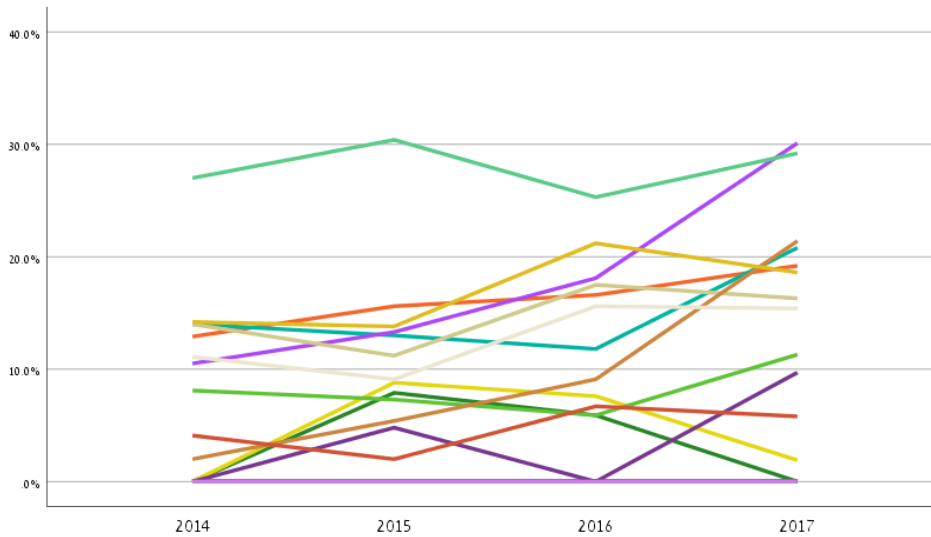
**D. Changes in each school achievements between 2014-2017: Five math units**

In this part we aim to predicate over time changes in the percentage of students who were tested for five math units. For that purpose, the above analyses were replicated. Here too, we first

<sup>4</sup> An average school was define as a regular school, with SES=5.58, size=98.4 students in grade 12<sup>th</sup> ; 0.37 (37%) teachers with MA degree; the median of teachers seniority is 15.98 and it is a three years high school (from grad 10<sup>th</sup> to 12<sup>th</sup>).

examine the patterns of change over time (2014-2017). Figure 16, present a scatterplot of the percentage of five math units for each school in the four points of time.

Figure 16: The trend of change in school percentage of students were tested for five math units certificate between 2014-2017 (an exemplify random sample of schools)



From Figure 16 we can see that schools tend to vary in their patterns of change. These changes were significantly found to fit a non-linear trends. These non-linear patterns, were taken into consideration while analyzing the data.

Table 3: Results of mixed model for longitudinal data for predicting school percentage of students that were tested for five math units between 2014-2017

	<b>Model 1</b>	<b>Model 2</b>	<b>Model 3</b>
	<b>Estimate</b>	<b>Estimate</b>	<b>Estimate</b>
Intercept	8.543*	8.431*	5.436*
time		.376*	0.101
Quaderic time		.677*	0.492*
Cubic time		.031*	0.073*
School SES			-4.787*
School SES* time			-0.378*
Arab Education			4.371*
Jewish-Religious			2.208*
Jewish-Secular			
Arab Education*time			0.311*
Jewish-Religious*time			0.445*
Jewish-Secular *time			

School size			2.315*
School size* time			0.063
Regular school			1.739*
Regular school* time			0.438
Special school * time			
Percent of MA teachers			1.165*
Percent of MA teachers * time			0.035
Teachers' median of years of seniority			0.433
Teachers' median of years of seniority* time			0.034
6 years high-School			1.622*
4-years high-School			0.372
3-years high school			
6 years high-School*time			0.161
4-years high-School *time			-0.016
3-years high school *time			

---

**Variance components**

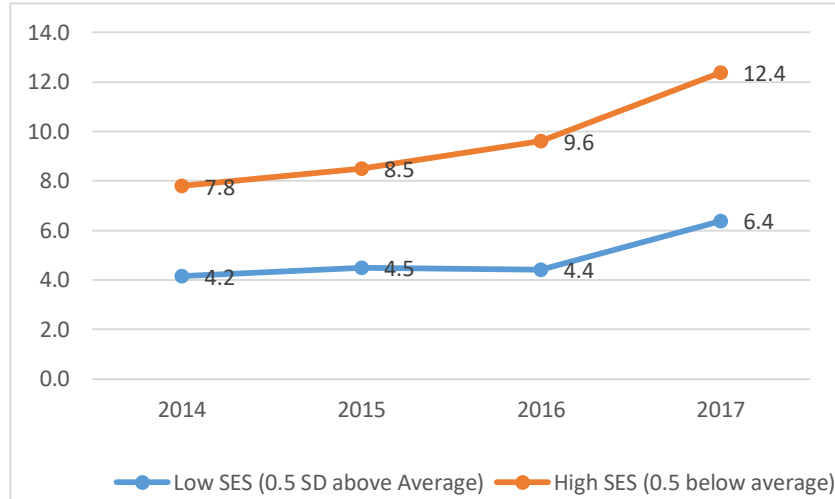
Repeated measures	15.1364	12.01504	14.93101
Intercept	97.5677	96.7251	49.02733
Intercept X Time		5.993885	2.201133
time		0.469037	0.108502

---

In Model 1, we included only the percentage of students who were tested for 5 math units. We found a significant variance between schools in regard to this variable. Further, on the overall, during 2014-2017, on average, about 8.54% of the students in each high school were tested for five math units. In Model 2, time variable was included. As it was revealed that the shape of the changes over time in five math units tend to be non-linear (see Figure 16), we included in the analysis a more complex time term: time as a linear, as quadric and as cubic. Apparently, the findings show that over time there is an increase in schools in the percentage of students who were tested for 5 math units, which tend to be accelerate over time. Further, we allow the time variable to vary across schools as significant differences were found between school in the time effect on the percentage of students who were tested for five units in math (the variance 0.469037).

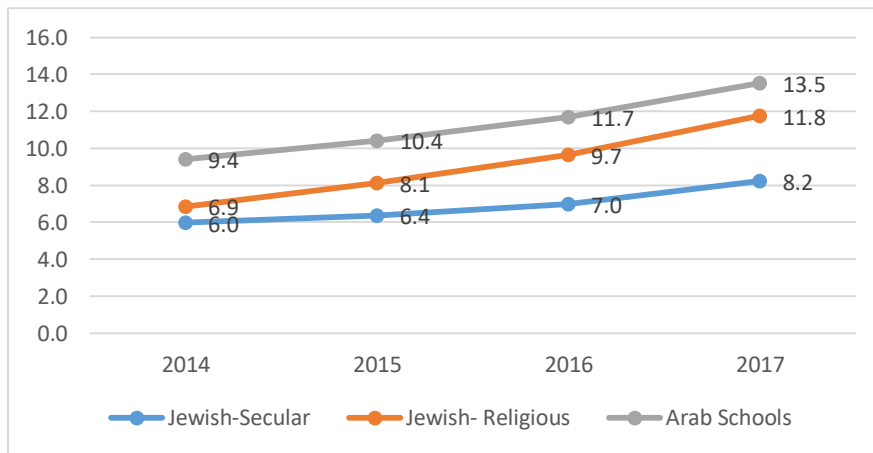
In Model 3, school educational system (sector) and school SES were added to the model, in addition to several school characteristics. The findings showed that high SES school do better than low SES schools (-4.799), and over time, high SES school tend to improve their percentage of students who were tested for five math units than low SES schools (-.378), this is illustrated in Figure 17. That is, there is an increasing gap between low and high SES schools. This hold even after controlling other school variables, reflecting school input in teaching, size and school structure.

Figure 17: The predicated percentage of students who were tested for five math units in an average Jewish-secular school by school SES between 2014-2017.



The findings in Model 4 also revealed that Jewish- religious (2.208) and particularly Arab schools (4.371) outperform Jewish secular schools, as shown in Figure 18.

Figure 18: The predicated percentage of students who were tested for five math units in an average school by educational system between 2014-2017.



In explaining the above findings we need to be cautious. We can assume that the Jewish-secular schools that are larger, more affluent and with higher professional teachers (percentage of MA teachers), may provide them with an advantage in their achievement. However after controlling

for these variables, it was revealed that the two other educational system may be more effective in leading their students for five math units. We can assume that internal process within the different educational may play a role in the advantage of the Arab and Jewish-religious schools. This however, need further testing and deeper examination.

## **Part 6: Conclusions**

Israeli educational system is evolving over time. Its current state reveal that the main four educational systems are different in their SES composition and achievements in matriculation eligibility and in taking five math units. The current report is the first stage for examining school improvement and providing a comprehensive and in-depth examination of the Israeli education system over time. For this purpose, we have begun to construct the initial infrastructure of the data files at the school level (and the beginning of the data at the student level).

This stage also placed an emphasis on describing academic achievement in terms of eligibility for school matriculation certificate and taking five units in mathematics. While discussing this issue, the distinctions between the four different educational systems must be address. In fact these distinctions is inherent within the education system, since the establishment of the state of Israel. Nowadays, this distinction cannot be ignored.

Indeed, we learned about the differences between the four educational systems in terms of the socio - economic composition of the schools and their geographical location statewide.

We also learned about the matriculation achievements of the schools over the years 2014-2017. Although the short period of four years, data revealed new trends in the Israeli education system, that still need to be further investigate. Nevertheless, following are several conclusions derived from the analysis of the data:

1. There is a steady increase in the percentage of eligible for matriculation certificate. Following the reform in five units in math, we are also witnessing an accelerated increase in the percentage of students in schools who were tested for five math units.
2. There are differences between the educational systems in matriculation achievements. On average, the proportion of pupils eligible to a matriculation certificate and taking five units is high in Jewish secular education, followed by religious Jewish education, Arab education, and Ultra-Orthodox education.
3. In any education system, high SES schools gain higher achievements than low SES schools, except in the Ultra - Orthodox schools.

So far, these findings reflect trends known about the Israeli education system.

However, looking over-time and controlling for school inputs (although these inputs are partial), afforded to discover new processes.



First, matriculation achievements in Ultra – Orthodox schools, is rising constantly, though still low, indicating about a slow integration of a matriculation exams and thus of the core-curriculum. In this educational system it is interesting to examine the composition of the matriculation certificate as there are no evidence for the prominence of math (very few take five units in mathematics).

Secondly, compared to the past in which the Jewish secular school had an advantage in matriculation certificate, two educational system may currently compete over high achievements: the secular Jewish religious education, which was generally higher in its achievements and the Arab education. This was revealed mainly when controlling for several school inputs.

In these educational systems, we are witnessing an improvement in the achievements of the schools. The Jewish-secular schools although it has an advantage in its SES composition and resources (e.g. school inputs), it appears to be less effective than schools in Arab education or Jewish-religious education. It seems that after controlling for several variables, the advantage of secular Jewish education, which was prominent in the past, is reduced.

Third, despite the improvement in achievements in the Arab sector, it should be noted that there are accelerated processes of growth in social gaps between high SES school compare to low SES.

These findings, show the diversity in the educational systems and point to the need of any educational system to design differential policies that will meet the unique characteristics and needs of each educational system.

## Bibliography

### Hebrew sources

- Almog-Barkat, G. & Inbar, D. (2010). "Whose Child Are You? Opening School Districts in Jerusalem," in Ichilov, A. (ed.) (2010), *Privatization and Commercialization in Public Education in Israel*. Tel Aviv: Ramot – Tel Aviv University, pp. 111-144.
- Dahan, M. (2013). *Did the Melting Pot Succeed in the Economic Field?* School of Public Policy, Hebrew University, and Israel Democracy Institute.
- Dror, Y. (2011). From a Private-Sectoral System at the Time of Yishuv to Controlled Privatization and its Reinforcement after the Establishment of the State, *Dor LeDor* [Studies in the History of Jewish Education] 39, 127-179.
- Gibton, D. (2004). "Awaiting Mizrahi v. Board of Education of Tofi-Gan Hasharon (not heard): A Comparative and Critical Look at the Supreme Court's Stance on Integration in Education in Israel, *TAU Law Review* 28, pp. 473-516.
- Gibton, D. (2010). Living According to Principles or Teaching Them? Law as an Instrument for Promoting Fairness in Education Reforms: Analysis of Three Cases, in Hacker, D., Ziv, N. (eds.) *Is Law Important?* (pp. 355-416). Tel Aviv: Faculty of Law, Tel Aviv University.
- Ichilov, A. (ed.) (2010). *Privatization and Commercialization in Public Education in Israel*. Tel Aviv: Ramot – Tel Aviv University.
- Kizel, N. (2011). The Zichron Ya'akov Model: The End of Middle School and the Return to Elementary School. *Studies in Education*, pp. 146-162.
- Knaani, S. & Shilhav, Y. (2001). "Social and Spatial Choices of Schools by Parents, *Horizons in Geography*, No. 53, University of Haifa, pp. 71-84.
- Ministry of Education, Chief Scientist office. (2007). *Committee for Determining the cultivation Index and the Model of Allocation of Standard Hours in Primary Schools report*. Retrieved from: <http://meyda.education.gov.il/files/Scientist/Shtraus.pdf> .
- Ministry of Education. (2014a). *The national plan to strengthen mathematics*. Retrieved from <http://edu.gov.il/sites/special/5/Pages/Goals.aspx> .
- Ministry of Education. (2014b). *Something good is happening now - milestones in significant learning*. CEO circular publication. Retrieved from: <http://meyda.education.gov.il/files/lemidaMashmautit/chozer/index.html> .
- Ministry of Education, Pedagogical Secretariat. (2015). *Meaningful learning in the disciplines from theory to practice: Adapting the teaching-learning-assessment practices and professional development*. Jerusalem: Author.
- Ministry of Finance. (2016). *Proposed State Budget for 2017-2018*. Retrieved from: [file:///C:/Users/DELL/Desktop/BugetProposal\\_2017-2018.pdf](file:///C:/Users/DELL/Desktop/BugetProposal_2017-2018.pdf) .

Ministry of Finance. (2018). *State budget proposal, for the fiscal year 2019. The budgets main points and the multi-year budget plan*. Retrieved from: [file:///C:/Users/DELL/Desktop/BudgetMain\\_1.pdf](file:///C:/Users/DELL/Desktop/BudgetMain_1.pdf).

Noy, B. (2014). *Whose Child? On Parents' Relations with Their Children's Schools*. MOFET Institute.

Raichel, N. (2008). *The Story of the Israeli Education System*. MOFET Institute.

Tamir, Y. (2015). *Who's Afraid of Equality? On Education and Society in Israel*. Yedioth Ahronoth Publishing.

### English sources

Addi-Racah, A. & Einhorn R. (2009) School governance and teachers' attitudes to parents' involvement in schools. *Teaching and Teacher Education*, 25 (6), 805-813.

Addi-Racah, A., Grinshtain, Y. & Bahak, H. (2015). *Trends of segregation or integration in the residential environment based on socio-economic status of pupils in the school*. Initiative for Applied Education Research, Israel Academy of Sciences and Humanities.

Chen, M. & Addi, A. (1995). Community politics, school reform and educational achievement. In R. Kahana (Ed.), *Educational advancement and distributive justice* (pp. 341-357). Jerusalem: Magnes Press, Hebrew University.

Gibton, D. (2011). Post-2000 law-based educational governance in Israel: From equality to diversity? *Educational Management Administration & Leadership*, 39(4), 434-454.

Gofen, A. & Blomqvist, P. (2014). Parental entrepreneurship in public education: a social force or a policy problem? *Journal of Education Policy*, 29(4), 546-569.

Mullis, I. V. S., Martin, M. O., Goh, S., & Cotter, K. (Eds.) (2016). *TIMSS 2015 Encyclopedia: Education Policy and Curriculum in Mathematics and Science*. Retrieved from Boston College, TIMSS & PIRLS International Study Center website: <http://timssandpirls.bc.edu/timss2015/encyclopedia/countries/israel/>.

OECD (2018a), *OECD Economic Surveys: Israel 2018*, OECD Publishing, Paris. Retrieved from: [http://dx.doi.org/10.1787/eeco\\_surveys-isr-2018-en](http://dx.doi.org/10.1787/eeco_surveys-isr-2018-en).

OECD (2018b), *2018 OECD economic survey of Israel- towards a more inclusive society*. OECD publishing, Jerusalem. Retrieved from: <http://www.oecd.org/israel/economic-survey-israel.htm>

Resh, N. & Dar, Y. (2012). The rise and fall of school integration in Israel: Research and policy analysis, *British Educational Research Journal*, 38, 929-951.

Volansky, A. (2006). Principalship in pluralistic societies: The case of Israel. *ISEA*, 34(1), 106-117.

Weiss, A. (2017). State snapshot: Charts on social and economic issues in Israel, Taub Center.

## Appendix 1

### Variables' definitions

- a. Student achievements were measured by two variables:
  1. Eligibility for matriculation certificate- students Eligibility for matriculation certificate, including special education.  
The variable calculation - Percent of students eligible to a matriculation certificate out of all 12<sup>th</sup> grade students in the schools that submit students to matriculation exams.
  2. Students that were tested for five math units certificate- Percent of students eligible to a matriculation certificate that includes 5 credits in mathematics out of all 12<sup>th</sup> grade students. The national average includes special education.  
The variable calculation- The percentage of students eligible to a matriculation certificate, which includes mathematics at a level of 5 study units out of all twelfth-grade pupils in Israeli schools, who submit to matriculation.
- b. School SES- the variable refers to the Ministry of Education's cultivation Index.  
The cultivation index is based on four components:  
The education of the most educated parent, the income level of the family, the school's peripherally and the combination of manslaughter and a country of distress.  
This index is used by the Ministry of Education to identify schools in which students from a disadvantaged socioeconomic population are study. Those students (and there by their school are eligible to additional resources compared to others. The cultivation Index determines a SES score for each school, which is the average of the cultivation scores of all its students (For each student in the school, a socioeconomic score is determined, consisting of the four componence's of the index). Cultivation scours are divided into 10 categories, with 1 for high socioeconomic status and 10 for the lowest, thus creating a division into the deciles that enable to assess the school's socioeconomic composition in relation to the general population. The purpose of the cultivation Index is to assist in the mapping and differentiation between schools with weak and strong populations. This index is used by the Ministry of Education in the allocation of resources according to the needs of students in various schools (for farther details- MOE, 2007).  
In the current stage of the project the SES cultivation index is Presented by quintiles.
- c. District- the geographic factor is measured by affiliation to the school's district.

- d. Education system- the type of Supervision for which the school is subordinate, among the four supervisions in the Israeli education system (Jewish secular, Jewish religious, ultra-orthodox and Arab).

Controlled variables:

- a. Percent of students who receive testing adjustment (e.g. more time in test, assistance in reading the test, etc.) 0- less than 10% 1. More than 10%.
- b. School structure:
1. School size- as measured by the amount of 12<sup>th</sup> grade students at the school.
  2. School type: school format of operation- three years school (10<sup>th</sup> -12<sup>th</sup> grade), four years school (9<sup>th</sup> -12<sup>th</sup> grade) or six years school (7<sup>th</sup> -12<sup>th</sup> grade).
- c. Teachers quality:
1. Percentage of teachers with academic education in school.
  2. Seniority – median years of seniority of teachers in school.

In the future more curricular, structural and students variables will be added.