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Sociological implications of the "High Five" national plan, to promote mathematics, on equal opportunities in Education

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Settings

by

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Abstract

In 2015 the Israeli Ministry of Education launched the "High Five" plan ("Latet Hamesh"), a national plan to promote, develop and encourage high school students to excel in mathematics. The implementation of this plan was a result of a number of factors: A decline amongst Israeli high school student's participation in mathematics matriculation exams at five-unit level between the years 2006 and 2014. And an adherence to the prevailing neo-liberal trends in Israel and the rest of the western world.

With the support of the "The Trump Foundation" and other organizations and an ensuing blitz of media coverage, the "High Five" plan commenced, with the goal of achieving higher rates of mathematical excellence amongst Israeli students.

The purpose of this study was to examine the actual impact of this plan on student's participation rates in mathematics' matriculation exams in Israel, between the years 2013 and 2017, whilst regarding the sociological aspects of this impact. This study examined the percentage growth of participation in a five-unit matriculation exam in mathematics due to the "High Five" among diverse social groups and backgrounds such as: gender, educational sector and parental education whilst controlling academic track and prior mathematics achievements. The social groups have been chosen based on prior academic studies, which implied them as a predictor of mathematic academic success.

The hypotheses of this research have been tested upon two different sociological paradigms. The functionalist paradigm assumes that the implications of the "High Five" plan, would lead to an expansion of students' participation in five-unit level matriculation exam in mathematics, for all social groups and would narrow the social gap between them. On the other hand, on the basis of the conflict paradigm, the assumption would be that the social gap would expand in favor of the affluent groups of Israeli society. In light of these two different paradigms, we have defined the variables and formulated four hypotheses:

1. The percentage of students, participating in matriculation exams in mathematics at a five-unit level would grow due to the "High Five" plan in comparison to the years prior the plan.

2. The gender participation gap in five-unit level matriculation exams in mathematics between boys and girls would narrow due to the "High Five" plan in comparison to the years prior the plan. That is due to recent findings which pointed to a narrowing of this disparity between the two groups as well as the resources invested in narrowing these margins in Israel and the rest of the world.

3. According to the conflict paradigm, the sectoral gap and parental education disparities, would either grow or remain as such, amongst the students at a five-unit level in mathematics, due to the "High Five" plan's implementation in comparison to the years prior the plan.

4. According to the functionalist paradigm the sectoral gap and parental education disparities, would narrow, amongst the students at a five-unit level in mathematics, due to the "High Five" plan's implementation in comparison to the years prior the plan.

In order to examine these hypotheses, variables have been defined. The dependent variable was: number of units in math matriculation exam (0,3,4 or 5). The independent variables were: year of exam taken (2013-2017), gender (male or female), educational sector (Jewish state, Jewish state-religious or Arab) parental education (educated or uneducated). The controlled variables were: academic track (academic or technological) and prior mathematics achievements of these students (based on prior achievements in 8th grade state growth and effectiveness measures for school's math exam.) Analysis of the data was based on public information from the Israeli Ministry of Education and included all Israeli students of the 12th grade level between the years 2013 and 2017. The total sample size of this study included 488,251 students.

In order to adequately answer the hypotheses raised by this study, we conducted descriptive analysis, which described the variable's correlations and distributions.

After that, by using Multinomial Logistic Regression Analysis, we analyzed the interactions before and after the "High Five" plan outset, in order to compare the outcomes of the plan and its absence on students' social profile. Based on the interactions, we calculated the estimate probability from Multinomial Logit Models, in order to predict the probability to partake in five-unit math exam after the "High Five" plan, as opposed to the probability prior to the plan. The estimate probability was calculated based on fixed sociological profile. To do so, one of the following categories was held as constant: A girl, of an educated parent, attending Jewish state sector school, on academic track with above average prior achievements in mathematics, in one standard deviation. Each comparison was based on one of the variables: gender, educational sector or parental education. The findings showed the following:

The First and Second Hypothesis of this study have been confirmed. The research's findings, do in fact, show that among the years 2013 and 2017 the percentage of students attending a five-unit level math matriculation exam had grown from 9.7% up to 15.8%.

In addition, throughout the years of study, an increase of 6.1% had been observed amongst students attending five-unit mathematical matriculation exams.

Whilst examining the correlations between the independent variables (gender, sector and parental education) and the dependent variable (number of units), we observed to some extent, percentage increase in five-unit math exam attendees amongst all categories of the independent variables.

The correlations pointed to a narrowing of the gender gap whilst maintaining the advantage to attend a five-unit level exam for boys. The regression findings indicated significant interactions between the "High Five" plan and all of the independent variables. Based on that, estimate probabilities were calculated for every independent variable. The analysis confirmed that the probability to participate in five-unit matriculation exam had increased after the plan compared to the probability prior the plan, for both gender categories. The plan benefitted girls compared to boys. For girls, the probability to participate in the five unit exam, grew from 19% prior the plan to 33% after the plan, and for boys from 29% prior the plan to 38% after the plan.

The third and the forth hypotheses were based upon two opposite paradigms. The third hypothesis had been confirmed to be true in regard to the "parental education" variable. We have found that the gap has grown in favor of students with highly educated parents, opposed to students without highly educated parents. The findings have been confirmed by both the chi square correlations and the estimate probability analysis. The probability to participate in five-unit exam, for students with

highly educated parents had grown from 19% prior the plan to 33% after the plan and for students without highly educated parents from 11% to 23%.

In regards to the "sector of education" variable, the results were more complex. The correlation between the variables sector and number of units implied that the sectorial gap between both Jewish sectors (state and state-religious) and the Arabic sector had grown and the gap between the Jewish sectors remained as it was. Estimate probability analysis and regression findings implied that the sectorial gap narrowed between the Arabic sector and the Jewish secular sector. Nonetheless, the gap between the mentioned two and the state religious sector has grown. The probability to participate in five-unit exam, for students from the Arab school sector had grown from 28% prior the plan to 33% after the plan. For students from Jewish state school sector the probability grew from 19% to 33%. And for the state religious sector from 20% prior the plan to 37% after the plan.

In addition, it's been found that students prior achievements were significant to their probability to participate in five-unit mathematic matriculation exam. The probability was higher, in correspondence to their higher prior achievements in 8th grade "state growth and effectiveness measures for school's" (MEITZAV) math exam.

In summary, the "High Five" plan contributed to the percentile growth of five-unit exam participants. In addition, the plan increased the probability to partake in five-unit exams among all social groups in this study. The "High Five" plan effected differentially upon those social groups. Therefore, we should address its sociological impact and influences on Israeli society.