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DISCUSSION PAPER SERIES

IZA DP No. 14910

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ABSTRACT

Bringing Underprivileged Middle-School Students to the Opera: Cultural Mobility or Cultural Compliance?*

This article assesses the impact of a two-year long project-based learning program conducted by the National Opera of Paris in a large number of junior high-schools located in underprivileged areas, aiming at preventing school dropout and tackling educational inequalities by providing disadvantaged students with the opportunity to discover the world of opera. Taking a counterfactual approach (propensity score matching), we measure the impact of participation in the program on final exam and continuous assessment grades. The analysis displays mixed results: a significant and positive impact for the students who participate in the program for its whole duration (two years), at least for continuous assessment scores, but a negative impact for those who leave the program after only one year. The contrast between the effects of full and partial participation in the program suggests that these may be primarily due to a selection effect in favor of the most culturally and socially compliant students, in line with Bourdieu's and Passeron's reproduction theory (1997 [1970]) rather than a mobility effect (DiMaggio, 1982) resulting from the transfer of cultural capital to disadvantaged students.

JEL Classification: I21, I29, Z11, Z18, C21

Keywords: project-based learning, middle school, statistical matching, mixed method, cultural capital

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Failure at school has often been attributed to the cultural gap that may exist between the resources students inherit from their families and school culture. In this paper, we focus on two distinct although often related strategies aimed at reducing this cultural gap: arts and culture education, and project-based learning. Arts education includes all didactic action directed towards the dissemination of artistic and cultural knowledge. Project-based learning refers to a didactic approach based on interdisciplinary and collaborative educational activities. Advocates of this approach assume that it has a propensity to reduce the distance between students with working-class backgrounds and the school environment, as it involves real, practical objects rather than purely theoretical, academic subjects. Project-based learning may interact with arts education to the extent that this pedagogical orientation often entails the production of artifacts such as creative writing, visual art, drawings, videos, photography, and on-stage performances.

Since 1991, the National Opera of Paris, in association with the regional educational districts (RED) of Paris, Créteil, and Versailles, has been implementing a program aimed at junior high-schools located in particularly deprived neighborhoods that mixes project-based learning and arts education. This program, called “*Ten months of School and Opera*” (TMSO) (in French “*Dix mois d’école et d’Opéra*”) is not exclusively concerned with democratizing access to the opera. Rather, it focuses on improving students’ self-confidence, motivation, school involvement, and on preventing dropout.

We will first attempt to assess the impact of this program on participating students’ educational achievements by means of a counterfactual approach. We focus on two sets of educational outcomes: students’ grades in the junior high-school final exam (“*brevet national des collèges*” or *BNC*) and students’ continuous assessment grades during 9th grade (the final year of junior high-school). We will then attempt to interpret the underlying mechanism of this impact, if any. This interpretation partly depends on how we understand the concept of cultural capital. Whereas the notion is most conventionally understood as relating uneven outcomes at school to unequal cultural resources, alternative understandings take into consideration the social arbitrariness involved in the evaluation of cultural assets in a school context that belongs primarily to middle-class culture.¹ The trade-off between these two understandings of the concept of cultural capital is of critical importance here as opera attendance is a particularly socially elitist practice.

If cultural capital is understood as a matter of unequal distribution of cultural resources, one should expect the impact of the TMSO program to result from the kind of cultural mobility once portrayed by Paul DiMaggio (DiMaggio, 1982). In this view, the program is basically supposed to help students to compensate for their lack of cultural resources. If cultural capital is rather understood in terms of cultural domination and arbitrariness, then the impact of such a program can be better interpreted in terms of its ability to favor student’s conformity to the cultural norms of the middle class.

In the following, we first review the existing literature on arts education and project-based learning (I). We then describe in more detail the program implemented at the National Opera of Paris since 1991 (II). We then present our data (III), our methods (IV), our hypotheses (V) and our results (VI), followed by a discussion on their implications and significance (VII).

¹ These two definitions correspond to two distinct phases in the work of Bourdieu and Passeron. The most widespread understanding of the notion of cultural capital corresponds to the argument developed in *The inheritors*, first published in France in 1964, while the most critical corresponds to the thesis later elaborated by Bourdieu and Passeron in *Reproduction* in 1970.

I. Arts education and project-based learning as remediation of educational inequalities

The TMSO program combines two educational approaches, arts education and project-based learning, the impact of which on student outcomes remains rather uncertain.

Project-based learning as a motivation and abilities booster

Project-based learning is a pedagogical doctrine that advocates for a more active, student-centered, and experiential approach to education. Originally introduced by William Heard Kilpatrick (1951), who was inspired by the philosophy of John Dewey, this alternative learning approach promotes students' autonomy in cooperative and goal-oriented learning (Knoll, 1995; Kokotsaki *et al.*, 2016). Beyond these general guidelines, there is no clear consensus on the exact definition of what project-based learning is. Its advocates emphasize the need for the program to be central to the school curriculum and to be motivated by an overarching question. They advocate a constructivist approach to knowledge and learning and insist on authenticity and realism, in the sense that the subject matter of the project must be related to important issues in the real world (Thomas, 2000). Projects usually result in concrete end-products realized by the students (Blumenfeld *et al.*, 1991; Hell *et al.*, 2006).

Project-based learning is also often presented as an effective tool for remedying school dropout rates and academic failure of ill-prepared or disadvantaged students. This alternative educational strategy is believed to enhance students' motivation, self-esteem, and other non-cognitive traits that facilitate learning, especially for the least academically compliant students (Blumenfeld *et al.*, 1991; Thomas, 2000; Doppelt, 2003). As a result, it has been claimed that project-based learning is especially effective with low-achieving students (Cuevas *et al.*, 2005).

These expectations have only been partially verified because of the methodological weakness of many of the existing impact assessment studies, which point to the positive influence of project-based learning strategies on some rather vague outcomes, mainly based on self-reported measures, such as school-climate and students' motivation (Thomas, 2000). Other studies have found a more specific impact on secondary school students' grades in science and technology (Geier *et al.*, 2008; Marx *et al.*, 2004; Hsu *et al.*, 2015) and in social studies (Finkelstein *et al.*, 2010; Gültekin, 2005; Halvorsen *et al.*, 2012; Hernández-Ramos and De La Paz, 2009; Summers and Dickinson, 2012). In one of the rare fully randomized controlled trials, Finkelstein and colleagues demonstrated a positive impact of project-based learning on economic literacy and problem-solving skills in economics (Finkelstein *et al.*, 2010).

Research has found mixed results as to the impact of project-based learning across the various skill domains. A longitudinal study of two British secondary schools revealed a significant advantage in mathematics for students enrolled in a project-based school compared to those enrolled in a traditional school (Boaler, 1998). However, subsequent research has found little if no impact of project-based learning in literature, languages, and arts, and the research often lacks robustness. Many studies have reported a positive impact of project-based learning on various educational outcomes, but with a few exceptions (e.g., Harris *et al.*, 2014), most have failed to employ an adequate research design, properly allowing for causal inference (Sweller *et al.*, 2007; Kokotsaki *et al.*, 2016).

Meanwhile, project-based learning has been extensively criticized by those who emphasize the importance of students' developing knowledge of specific content in traditional subject areas (Kirschner *et al.*, 2006). Nonetheless, those who see this educational approach as a way of reducing social (Holmes and Hwang, 2016) and gender (Boaler, 1998) inequalities among students still champion its implementation. It has also been claimed that problem-based learning is specifically effective with low-achieving students (Cuevas *et al.*, 2005), thanks to its ability to improve these students' motivation and self-image (Doppelt, 2003).

Arts education and skills transfer

The promotion of arts education is often conditional on external ends (Rabkin and Redmond, 2006), relying on the assumption that artistic training and practice may boost the development of other relevant abilities (Fowler, 1996; Fiske, 1999; Deasy, 2002; Hetland, 2000; Hetland *et al.*, 2007; Spelke, 2008; Martin *et al.*, 2013). Exposure to the arts is thus frequently considered from the perspective of skill transfer (Detterman & Sternberg, 1993; Catterall, 2002) and most existing studies on the impact of arts education predominantly focus on its extrinsic effects (Winner & Cooper, 2000), rather than on its intrinsic effects, which are more difficult to grasp and measure, including long-term attitudes and behaviour towards the arts and culture themselves (Winner *et al.*, 2013).

Some research highlights a positive and significant relationship between exposure to arts education and educational outcomes (Heltland and Winner, 2001; Catterall *et al.*, 2012), but few clearly establish a causal link between the two (See & Kokotsaki, 2015). Existing studies are predominantly observational (Winner & Cooper, 2000), and the few studies that rely on experimental or quasi-experimental design, minimally including a control group and some comparison of pre- and post-treatment measurements, provide fairly inconclusive results (See & Kokotsaki, 2015). The observed direct effects on students' cognitive skills are generally rather small (Gardiner *et al.*, 1996; Mishook & Kornhaber, 2006), often statistically hardly significant, whether positive or negative (Baum and Owen, 1997). Nonetheless, a not insignificant number of studies display a more or less robust impact of arts education on various capacities: IQ scores (Kaviani *et al.*, 2014), spatial-temporal reasoning (Gromko and Poorman 1998), reading abilities (Register *et al.*, 2007; Myant *et al.*, 2008; Cochran, 2009; Harris, 2011; Bryant, 2013), vocabulary range (Vaughn and Winner, 2000), numeracy and mathematical reasoning (Vaughn and Winner, 2000; Courey *et al.*, 2012), and memory and retention of information (Smithrim & Upitis, 2005; Hardiman, 2010; Rinne *et al.*, 2011; Hardiman *et al.*, 2014).

That said, most of the observed significantly positive effects of arts education on school outcomes tend to be indirect and non-cognitive. Hence a great deal of the existing research stresses the impact of arts education on students' motivations and aspirations (Gardiner *et al.*, 1996; Csikszentmihalyi, 1997; Winner & Cooper, 2000), self-assessment and self-confidence (Rose *et al.*, 2000; Deasy, 2002; Rabkin & Redmond, 2006), enjoyment (Otten *et al.*, 2004), and social skills (Schellenberg, 2004, Catterall, 2007; Goldstein *et al.*, 2013). Emphasis has also been put on the alleged contribution of arts education to the prevention of school dropout (Mahoney & Cairns, 1997; Thomas *et al.*, 2015).

The impact measurement of arts education on school outcomes is often obfuscated by the high number of potential confounding factors. For example, Vaughn and Winner (2000) have suggested that the correlation observed in the United States between SAT grades and participation in arts and culture courses may simply be related to the fact that the most motivated students tend to take more elective courses to improve their grades.

In addition, the impact of arts education appears highly variable depending on the subject matter. The strongest evidence is found in music education, which has been found to increase IQ (Schellenberg, 2004), phonological skills, and decoding abilities (Mingat and Suchaut, 1996; Gromko, 2005; Moreno *et al.*, 2009; Degé and Schwarzer, 2011). Some evidence has also been found in support of drama-based teaching (Podlozny, 2000). Contrastingly, little evidence has been found in support of programs that mix various artistic subjects or domains (Luftig, 2000).

Finally, the impact of arts education is also highly sensitive to students' academic and social backgrounds, with it being stronger for students with a low socioeconomic status and at risk of dropping out (Catterall *et al.*, 2012). It also varies by education level, being generally stronger for pre-

school and primary school students than it is for secondary school students, although the lack of evidence in favor of the impact of arts education for the latter may partially be due to the methodological flaws of the existing studies (See and Kokotsaki, 2015).

II. A project-based learning program at the National Opera of Paris

The *Ten Months of School and Opera* (TMSO) program was created in 1991 at the National Opera of Paris (NOP). Schools participating in the program are all located in the *Ile de France* Region, including the city of Paris and its suburbs. Almost all these schools are part of the “priority education areas” (in French: *Zones d’Education Prioritaire*, hereafter ZEP), which group schools located in particularly deprived neighborhoods, with a high proportion of students from working class families and foreign-born parents, a high rate of unemployment, and a significant proportion of social housing.

Initially designed to last ten months (hence its name), TMSO was quickly extended to two years. The program initially included visits to the NOP’s two venues, the *Bastille Opera House* and the *Palais Garnier*, a series of meetings with artists and representatives of the other professions working at the NOP, and attendance at opera and ballet performances. It then grew to include activities aimed at strengthening the involvement of parents, who are invited, alongside their children, to discover the NOP buildings and encounter those who work there. It now also offers practical artistic workshops focusing primarily on choral singing, drama and dance activities, and very rarely on activities involving instruments. The workshops also regularly make use of visual art, writing activities, photography, and video. Students in some classes benefit from the involvement of a complete artistic team (stage direction, scenography, singing, dance, theatrical expression...) in order to perform on the stage of the *Bastille Amphitheater*, the second stage of the *Bastille Opera House*, at the end of the school year. The TMSO program develops a plurality of objectives: cultural openness, social inclusion and trust, the development of self-esteem and self-confidence, citizenship training including aspects of civic and moral education, and the prevention of school failure and dropout.

In this article, we focus on 49 junior high schools that participated in the program between 2003 and 2011. Each year, a commission formed by NOP staff members and Paris, Creteil, and Versailles RED representatives select the schools to be enrolled in the program, based on an application made by a team of teachers. Only one team of teachers in each school may apply and only one class in each school may be selected. The program may be attended by students aged approximately 11 to 14, from *sixième* to *troisième*, corresponding to 6th to 9th grades in the US system and years 7 to 10 in the British system.² An average of five classes from five different junior high schools participated in the program each year between 2003 and 2011 (the number of participating classes was between 3 and 9, depending on the year). Each selected class was enrolled in the program for two years. The teachers remained roughly the same for the two years of the program. The class composition also remained roughly the same, at least theoretically. In practice, the composition of the class could in fact partly vary between the beginning and the end of the project, and this is not without consequences when measuring the impact of the program, as will be seen.

² Students may be enrolled in *sixième* and *cinquième* (i.e., 6th and 7th grades, or years 7 and 8), *cinquième* and *quatrième* (7th and 8th grades, or years 8 and 9) or *quatrième* and *troisième* (8th and 9th grades, or years 9 and 10). Practically, the second modality (*cinquième* and *quatrième*) is the most frequent. Almost half of the 49 schools under consideration in our analysis (23 schools) enrolled their students in the program in *cinquième* and *quatrième*, 16 in *sixième* and *cinquième*, and 10 in *quatrième* and *troisième*

Each class is selected based on a project which is supposed to structure the participation of the students and their teachers in all the activities proposed by the Opera. Usually, this project refers to one of the works performed at the Opera House or to a wider theme related to the world of Opera or the performing arts. The program mainly takes place during school hours, except for some visits and performances. It is mostly integrated with ordinary school activities, especially French, history, music, and visual arts, and more sporadically with mathematics and science. It aims to produce a tangible item (a journal, a visual art piece, a script, a video, an exhibition) and encourages active and collaborative participation from students, all constitutive criteria of the philosophy of project-based learning. But the program also departs from this doctrine to the extent that the organization of the class is only partially structured around the activities related to the Opera. Most of these activities are additional to regular school activities, and do not really constitute part of an alternative pedagogy encompassing the entirety of school life.

The program can also include an arts education component, but it cannot be considered to be completely dedicated to that purpose. Indeed, its advocates originally emphasized its extrinsic function as a tool for remediating school failure and dropout rates, and the expectations placed on it principally concern this aspect.

III. Data and outcomes

The impact analysis of the TMSO program predominantly relies on statistical data and methods, in combination with field observations made between 2015 and 2018 that helped us to refine and operationalize our research hypotheses. As we draw on observational data, the impact measurement is based on a counterfactual approach that aims to overcome the limitations of usual regression techniques.

Data

Most of the data used in the following analysis comes from the FAERE database, which is managed by the French Ministry of Education (*Fichier Anonymisé pour les Études et la Recherche*, literally: Anonymous Database for Studies and Research). This database, created in 2003, is an exhaustive longitudinal file that follows all French students throughout their secondary education, from 6th grade (in middle school) to 12th grade (in high school), provided they do not drop out before this. It contains information related to their school trajectories (exam results, pathways followed) together with some information about their family (parents' professions, number of siblings), their environment (place of residence), and classes and schools attended (including aggregated data on the social background of students and teachers). Following an agreement with the French Ministry of Education, we matched this data with that related to the classes and students participating in the TMSO program for the period between 2003 to 2011.³

This data has been supplemented by a small number of interviews conducted with former students who participated in the program between 2003 and 2011.⁴ We also supplemented this data with a

³ The agreement with the National Education Ministry allowed us to make an indirect matching with the FAERE dataset, identifying the classes and schools involved in the program each year.

⁴ In practice, it proved quite difficult to locate the students some ten years later, and when this was possible, we were confronted with an obvious problem of selection bias. It is highly realistic to imagine that those we were able to locate and who were open to sharing their views and memories about the program were not at all representative of the whole student body formerly involved in the program. They were probably more likely to

series of observations made on the implementation of the same program over a different period, between 2015 and 2018, in two middle schools. In each school, we attended regular class sessions in addition to sessions explicitly related to the program, including artistic workshops and visits to the Opera. We also conducted a series of interviews with some of the teachers involved in the program. Finally, we made use of several documentary archives held by the Opera concerning the program, particularly the Opera "notebooks" and "diaries" produced each year in partnership with teachers and their students. All this qualitative material has been used in the elaboration of some of our hypotheses and has helped in interpreting some of the results of our statistical analysis.

Outcomes and treatment variables

The outcomes under consideration are twofold. We focus on students' grades in the final middle school exam, which takes place at the end of 9th grade, and on their continuous assessment grades during the same year. For both the exam and continuous assessment, the grades under consideration correspond to the overall average of grades obtained in all subjects (maths, French, history, etc.). Grades range from 0 to 20 and are treated as continuous dependent variables.

The measurement of the program's impact is based on the comparison of the grades of students who participated in the program and those who did not. Participation in the program is thus considered as a treatment variable that splits the population into two groups, as would be the case in an experiment with a treated and a control group. Due to the duration of the program, the definition of the treatment variable cannot be reduced to the contrast between participants and non-participants. While some of the students participated in the program for its entire duration, and others did not participate at all, due to various contingencies (families that moved or students who changed class, for instance), some students left the program after one year while others joined it at the beginning of the second year. The treatment variable is thus a 4-level variable, corresponding to four subgroups of students, namely non-participants (coded 00), participants in year 1 only (coded 10), participants in year 2 only (coded 01), participants in year 1 and year 2 (coded 11).

The sample

The following analysis therefore applies to all the students of the 49 high schools who participated for at least one year in the program between 2003 and 2011, together with their control peers, i.e., non-participants in the same grade. To illustrate this point, if in the school year 2004-2005, one 7th grade class (*cinquième*) in middle-school A enters the program for two years (i.e., 2004-2005 and 2005-2006), all the students at the same school A entering 7th grade in 2004 are included in the sample, whether they are part of the program or not. We have proceeded in this manner for all the 49 schools/classes. The result is a sample of 6,019 students distributed as shown in Table 1.⁵

be those who still had positive feelings about the program, or at least those who were most influenced by the experience.

⁵ For a detailed distribution by schools, see Annex 1.

Table 1. Composition of the study sample

Subgroups of students	Number	Percentage
Non-participants	4,929	82%
Participants in year 1 only	182	3%
Participants in year 2 only	225	4%
Participants in year 1 and 2	683	11%
All students	6,019	100%

Source: DEPP (Ministry of National Education, school years 2003-2012)

A very small number of students among the 1,090 students who participated in one or two years of the program repeated at least one class. We have therefore excluded them from the data treatment because their numbers were too small for making a comparison with the minority of those repeating among non-participants (less than 10%). Table 2 indicates the numbers of those repeating in each grade (from grade 6th to grade 9th), according to the number of years of participation in the program and the grade at entry into the program. Table 2 shows that, in terms of repetition between the 6th and 9th grades, differences between non-participants and participants in year 1 only or in year 2 only are not statistically significant. However, the repetition rate of “full” participants in years 1 and 2 (6%) is significantly lower than that of non-participants.

Table 2. Numbers of students repeating in each grade, according to the number of years of participation in the program and the grade at entry into the program.

Numbers of students who repeated the:	6 th grade	7 th grade	8 th grade	9 th grade	All repeaters	All students	Percentage of repeaters
Grades during which the program is implemented:	<i>Participants in years 1 and 2</i>						
6 th -7 th grades	0	0	9	11	20	244	8%
7 th -8 th grades	10	0	0	4	14	304	5%
8 th -9 th grades	5	2	0	0	7	135	5%
<i>All</i>	15	2	9	15	41	683	6%
Grades during which the program is implemented:	<i>Participants in the 1st year only</i>						
6 th -7 th grades	0	0	0	2	2	36	6%
7 th -8 th grades	11	0	0	2	13	105	12%
8 th -9 th grades	5	0	0	0	5	36	14%
<i>All</i>	16	0	0	4	20	177	11%
Grades during which the program is implemented:	<i>Participants in the 2nd year only</i>						
6 th -7 th grades	0	0	3	9	12	70	17%
7 th -8 th grades	3	0	0	5	8	118	7%
8 th -9 th grades	0	1	0	0	1	37	3%
<i>All</i>	3	1	3	14	21	225	9%
<i>Non-participants</i>	144	24	78	211	457	4,934	9%
<i>All students</i>	178	27	90	244	539	6,019	9%

Source: DEPP (Ministry of National Education, school years 2003-2012)

Descriptive statistics reproduced in Table 3 do not show major imbalances between the four levels of the treatment variable regarding the principal sociodemographic and educational determinants, except for the relative over-representation of boys and students with a working-class background among those following the program. Similarly, students attending school in ZEP, which concentrate a high proportion of students from working-class families, and with foreign-born or unemployed parents, among other criteria, are also significantly over-represented in the program (see Table 3).

Table 3. Sociodemographic and educational determinants of participants and non-participants

	Non-participants (00)	Year 1 only (10)	Year 2 only (01)	Years 1 & 2 (11)	All
Parents' socioeconomic background					
Craftspeople, shopkeepers	6%	7%	5%	5%	6%
Service industry	22%	16%	18%	18%	21%
Working class	59%	64%	62%	64%	60%
Inactive or unemployed	14%	13%	15%	13%	14%
Gender					
Boys	50%	57%	49%	44%	49%
Girls	50%	43%	51%	56%	51%
At least one repetition before entry into 6th grade					
Yes	16%	19%	16%	16%	16%
No	84%	81%	84%	84%	84%
School in a priority education zone (ZEP)					
No (outside a ZEP)	27%	36%	34%	21%	27%
Yes (within a ZEP)	73%	64%	66%	79%	73%
Number of children in the household					
Less than 3	48%	42%	52%	47%	48%
3 and more	52%	58%	48%	53%	52%
Size of the school					
Q1 (1 st quartile)	23%	27%	34%	35%	25%
Q2 (2 nd quartile)	25%	30%	31%	25%	25%
Q3 (3 rd quartile)	25%	24%	17%	22%	25%
Q4 (4 th quartile)	26%	19%	17%	18%	25%
Number of students	4,929	182	225	683	6,019

Source: FAERE database (DEPP, Ministry of National Education, school years 2003-2012)

IV. Methods

The impact analysis proposed in the following sections is based on a multi-valued treatment evaluation model with four treatment states. Notations for the treatment states are as follows:

- $T_0 = 1$ if the student does not participate at all in the program, which corresponds to the sequence (0,0), $T_0 = 0$ otherwise,
- $T_1 = 1$ if the student participates in the program in the first year but not in the second, which corresponds to the sequence (1,0), $T_1 = 0$ otherwise,
- $T_2 = 1$ if the student does not participate in the program in the first year but participates in the second year, which corresponds to the sequence (0,1), $T_2 = 0$ otherwise,
- $T_3 = 1$ if the student participates in the program for two years, which corresponds to the sequence (1,1), $T_3 = 0$ otherwise.

Estimates of a least squares regression of the outcomes on these four treatment states are potentially biased since they ignore selection and self-selection biases, they do not properly address counterfactual issues, and they do not correspond to relevant estimands (like the Average Treatment

Effect – ATE -, and the Average Treatment Effect on the Treated – ATET -). However, it is difficult to use most causal inference methods with our data, because:

- There is no randomized assignment to the program (i.e., this is not an RCT, but a quasi-experiment)
- We do not observe pre-program outcomes (for example, grades in 6th grade), which would have allowed us to use a difference-in-differences method
- We cannot observe a “super control group” (i.e., high schools without any participants)

Thus, our strategy is to resort to generalized propensity scores for multi-valued treatments and observational data, which are generalizations of matching methods with a single binary treatment.⁶ Our approach is like that used in previous studies on the impact of comparable educational programs (see, for instance, Algan and Hille, 2010), and more broadly on the academic impact of arts practices (see Hille and Schupp, 2015). This approach extends the general framework developed by Imbens (2000) and Lechner (2001), which was then applied to duration outcomes by Brodaty, Crépon, Fougère (2001). This framework generalizes Rubin’s model (1974, 1977) introduced for the case of a unique treatment. In our case, there are 4 treatments, denoted (0,0), (1,0), (0,1) and (1,1), respectively. The assignment to treatment $j \in [(0,0), (1,0), (0,1), (1,1),]$ is indicated by the binary variable T_j (see above). Consequently, there are 4 potential outputs (scores), denoted $Y_0, Y_1, Y_2,$ and $Y_3,$ both for the final exam and the continuous assessment in 9th grade.

The validity of the method is based on a crucial assumption known as the ignorability assumption: this assumption states that the distributions of potential outcomes are independent of the treatment variables $T_j, j = 0,1, \dots, 3,$ conditional on confounding variables X (i.e., covariates), namely:

$$(Y_0, Y_1, Y_2, Y_3) \perp\!\!\!\perp (T_0, T_1, T_2, T_3) | X$$

Under this assumption, it can be shown that, for any student i with potential outcomes $(Y_{0,i}, Y_{1,i}, Y_{2,i}, Y_{3,i}),$ either at the final exam or at the continuous assessment in 9th grade:

$$(Y_{j,i}, Y_{j',i}) \perp\!\!\!\perp (T_{j,i}, T_{j',i}) \left[\left(\Pi_j(X_i), \Pi_{j'}(X_i) \right) \text{ for any } j' \neq j, j \text{ and } j' \in [(0,0), (1,0), (0,1), (1,1),] \right]$$

with $\Pi_j(X_i) = Pr(T_{j,i} = 1 | X_i)$ and $\Pi_{j'}(X_i) = Pr(T_{j',i} = 1 | X_i).$ This last result helps to estimate the ATETs defined as $E[Y_j - Y_{j'} | T_j = 1]$ for any $j' \neq j$ (in particular, $j' = 0$), especially when using IPW (inverse probability weighting) estimates (see below).

In our application, we estimate three types of estimators, which are adapted to generalized propensity scores for multi-valued treatments.⁷ The first is the regression adjustment (RA) estimator which models the outcome to account for the non-random treatment assignment. More explicitly, we consider two OLS regressions $Y_{j,i} = X_i b_j + u_{j,i}$ for $T_{j,i} = 1,$ and $Y_{j',l} = X_l b_{j'} + u_{j',l}$ for $T_{j',l} = 1.$ Then we denote \hat{b}_j and $\hat{b}_{j'}$, the least squares estimates of b_j and $b_{j'}$, and the corresponding predicted outcomes $\hat{Y}_{j,i} = X_i \hat{b}_j$ and $\hat{Y}_{j',i} = X_i \hat{b}_{j'}$. The RA estimate of the ATET $E[Y_j - Y_{j'} | T = j]$ is simply:

$$\frac{1}{n_j} \sum_{i=1}^{n_j} X_i (\hat{b}_j - \hat{b}_{j'}) \quad \text{with } n_j = \sum_1^n 1 [T_{j,i} = 1]$$

⁶ For this purpose, we used the *Stata* package *teffects*.

The second estimator is the inverse probability weighting (IPW) which models the treatment to account for the non-random treatment assignment. In this case, under the ignorability assumption, the ATET may be estimated by:

$$\frac{\sum_1^n 1 [T_{j,i} = 1] Y_i}{\sum_1^n 1 [T_{j,i} = 1]} - \frac{\sum_1^n 1 [T_{j',i} = 1] w_i[j, j'] Y_i}{\sum_1^n 1 [T_{j',i} = 1] w_i[j, j']}$$

where $w_i[j, j'] = \hat{\Pr}(T_{j,i} = 1 | X_i) / \hat{\Pr}(T_{j',i} = 1 | X_i)$. Each control unit is weighted by the reciprocal of the probability of receiving the treatment j' it receives relative to the probability of receiving the target treatment j . Units in control group j' with a relatively high probability to be in the treated group j get larger weights since they are most representative of the target treatment group j . And reciprocally.

The third estimator denoted IPWRA (inverse probability weighting with regression adjustment) models both the outcome and the treatment to account for the non-random treatment assignment. In this last case, the ATET estimator becomes:

$$\frac{\sum_1^n 1 [T_{j,i} = 1] X_i \hat{b}_j}{\sum_1^n 1 [T_{j,i} = 1]} - \frac{\sum_1^n 1 [T_{j',i} = 1] w_i[j, j'] X_i \hat{b}_{j'}}{\sum_1^n 1 [T_{j',i} = 1] w_i[j, j']}$$

where $w_i[j, j'] = \hat{\Pr}(T_{j,i} = 1 | X_i) / \hat{\Pr}(T_{j',i} = 1 | X_i)$.

V. Hypotheses

Previous research suggests an impact of arts education and program-based learning on school performances. Based on this literature, we may anticipate a positive impact of TMSO on school outcomes.

First hypothesis: TMSO has a positive impact on school outcomes for the participants.

H1a: participation in TMSO program improves students' performances in the BNC exam.

H1b: participation in TMSO program improves students' performances in 9th grade continuous assessment.

In its scope and duration, the TMSO program differs from many existing programs in the field of arts education and project-based learning. The program is quite comprehensive, including various didactic and cultural aspects, together with behavioral and attitudinal dimensions related to students. One should expect the two-year duration of the program to reinforce its impact. The specific impact of the length of exposure to the program can be tested in this case thanks to the fact that not all students participated for the full two years.

Second hypothesis: the longer the students are exposed to the program, the greater its impact.

H2: the impact of TMSO is greater for students enrolled in the two-year program than for those enrolled for only one year.

The program may also be considered from the perspective of the transfer of cultural capital it realizes for socially and culturally underprivileged students. Prior research on the impact of cultural resources on school achievement has produced two contrasting hypotheses in this regard. The reproduction hypothesis, developed in Bourdieu's and Passeron's (1977 [1970]) book by the same name, suggests

that cultural capital works mainly to the advantage of children from a higher social class, who benefit from a deeper and earlier socialization in the cultural resources valued in the school context (Lareau, 2015) and in the implicit rules that govern their mobilization (Aschaffenburg and Maas, 1997). Students from middle-class backgrounds are thus more likely to make their cultural possession recognized and rewarded in the school context. The cultural mobility hypothesis, on the other hand, originally formulated by Paul DiMaggio, argues that pupils from disadvantaged backgrounds benefit from a greater return from cultural capital (DiMaggio, 1982), to the extent that cultural capital may offset the lack of social or economic resources whereas middle-class families can exploit many other resources to pass on their social position to their offspring and can afford to neglect to take advantage of their cultural resources (de Graaf *et al.*, 2000). The cultural mobility hypothesis also stems from the expectation that teachers particularly reward the small minority of low-socioeconomic status (SES) students who exhibit cultural signals of the sort usually expected from high-SES students, to whom they therefore pay less attention. In DiMaggio's view, the same holds true, at least in the American context, for Afro-American students in comparison with white students, and for boys in comparison with girls. As both female and white students are more likely than male and Afro-American students to display involvement and interest in high-culture activities and less likely to be invested in adolescent culture, one should expect teachers to particularly reward the small minority of boys and Afro-American students who exhibit cultural signals of the sort expected from girls (Coleman, 1961) or white students.

Subsequent empirical studies have produced rather inconsistent results. Roscigno and Ainsworth-Darnell (1999) demonstrate that in the American context, Afro-American, and low-socioeconomic status (SES) students tend to receive less educational returns from their cultural capital than white and high-SES students, in accordance with the predictions of the reproduction thesis. Conversely, Kalmijn and Kraaykamp (1996) claim that cultural capital may have benefited black students more than white students and that this may explain the historical black-white convergence in schooling in the United States. In the Netherlands, De Graaf *et al.* (2000) find that parental reading, but not parental beaux-arts participation, affects children's educational attainment, as does Crook (1997) in Australia, and this regardless of their social status, which thus also seems to give some support to the cultural mobility theory. In the US, Dumais (2006) also demonstrates that children's cultural activities have a positive impact on teachers' evaluation of their skills, but only for low-SES students. Various studies on the effect of parental reading habits and book ownership support the same argument (Evans, 2010, Evans *et al.*, 2014; Kelley *et al.*, 2015; Sikora *et al.*, 2019). Andersen and Jaeger (2015) support the idea that the return from cultural capital is higher in low-achieving than in high-achieving environments. Nonetheless, other studies find no difference in the effect of cultural capital according to social background (Blaskó 2003), whereas others insist on the heterogeneous effect of the varying forms of cultural capital (Jæger 2011). Based on the existing literature and the available information in our data, we may thus test for two competing hypotheses: that the magnitude of the impact of TMSO is either positively or negatively correlated with students' social status and gender.⁸

Third hypothesis: The magnitude of the impact of TMSO on school achievement depends on students' background and gender.

H3a: Girls and students from high-SES tend to display a higher impact of TMSO (Reproduction thesis).

⁸ In the absence of any reliable information on racial belonging and/or origin of the students and their families in our data, we will not test for any hypothesis related to this dimension of student identity and background.

H3b: Boys and students from low-SES tend to display a higher impact of TMSO (Mobility thesis).

Both the reproduction and the mobility theories have been challenged by the resistance working-class children may show to the cultural norms of the school (Willis, 1977). This antiacademic culture may eventually reinforce the educational and cultural subordination of low-SES students, who in a way exclude themselves from the benefits of schooling and culture. It can also lead to some self-selection effects when low-SES background and low-achieving students reject the cultural resources offered to them. With respect to the TMSO program, this cultural resistance theory may help understanding why some students attend the program for its entire duration (two years), and why others leave it early, generally during or at the end of the first year, since the duration of exposure partially and indirectly corresponds to the degree to which students comply with the content and expectations of the program. Accordingly, we should not only expect those who attend the program for its entire duration to perform better than those who attend the program for only one year, but also that the latter may perform more poorly than those who do not attend the program at all.

Fourth hypothesis: students who attend the program for only one year perform more poorly than all other students.

H4: the impact of TMSO is negative for the students enrolled in the program for only one year and positive for those enrolled for the duration of the whole program.

VI. Results

Table 4 reports the effects of participation in the TMSO program on grades obtained during the continuous assessment and in the final 9th grade exam when controlling for various socio-demographic covariates in OLS regressions. The OLS estimates show that, all things being equal, the grades obtained by students who participated in the TMSO program for two years are on average higher by 0.11 in the final exam and 0.17 in the continuous assessment, compared to non-participants, which is in line with our hypotheses H1a and H1b.⁹ The grades obtained by students who participated in the 1st year only are on average 0.25 points lower in both academic assessments compared to non-participants, as predicted by our fourth hypothesis H4. On the other hand, students joining the program during the second year only (O1) do not display any significant difference in their school performance, whatever the indicator at stake. These estimates also partially support hypothesis H2, as partial participation seems in any case less effective than full participation in the program. Moreover, OLS regressions show that students who repeated at least one grade before entering 6th grade, those who are schooled in ZEP, those who live in a household with 3 children and more, and whose parents have a low SES background, obtain significantly lower grades, while girls, students whose first choice of a modern language other than French is not English,¹⁰ and those whose parents have an elevated socioeconomic background have higher scores on average.

⁹ The unit of measure is the standard deviation of the score distribution.

¹⁰ In France, foreign language learning begins in 6th grade, and students begin learning a second foreign language in 8th grade. Most pupils choose English as their first language. But traditionally, good pupils from privileged backgrounds tend to choose German as their first language and English as their second language. Not choosing English as the first language in 6th grade can therefore be considered as an indirect indicator of academic and/or social selection.

Table 4. Effects of participation in the TMSO program on grades obtained during the continuous assessment and in the final exam in 9th grade (OLS regressions)

	Continuous assessment		Final Exam	
	Estimate	s.e.	Estimate	s.e.
Participation in the program (ref.: 00)				
10	-0.247***	0.083	-0.261***	0.082
01	0.062	0.072	0.0311	0.072
11	0.162***	0.042	0.0985**	0.041
Gender (ref. : boy)	0.298***	0.027	0.232***	0.027
Repeating before 6th grade	-0.601***	0.039	-0.690***	0.039
First choice of modern language not English	0.306***	0.070	0.328***	0.069
Socioeconomic background (ref.: small self-employed)				
Middle class	0.129**	0.065	0.118*	0.065
Working class	-0.146**	0.060	-0.225***	0.060
Unemployed and inactive	-0.287***	0.068	-0.368***	0.068
More than 3 siblings	-0.096***	0.028	-0.127***	0.028
Schooled in ZEP	0.097***	0.031	0.126***	0.031
Intercept	-0.007	0.065	0.158**	0.065
	N = 4,838, Adj. R2= 0.109		N = 4,740, Adj. R2 = 0.125	

Source: FAERE database (DEPP, Ministry of Education, school years 2003-2012).

Finally, Figure 1 graphically represents IPWRA point estimates (with their 95% confidence intervals) of the effects of the different forms of participation in the program (sequences 10, 01 and 00) compared to the reference sequence 00 (non-participation in both years). These estimates partially overcome the limitations of OLS estimates. Participation in the whole program (for two years) again proves to have a statistically significant and positive effect on the continuous assessment grade, but a less significant effect on the 9th grade final exam grade. H1b is therefore supported, but H1a is not. In addition, participation in the 2nd year only has no effect on either of the grades, while participation in the 1st year only has a significant negative effect on both grades. Thus, our assumption H2 is partially supported.

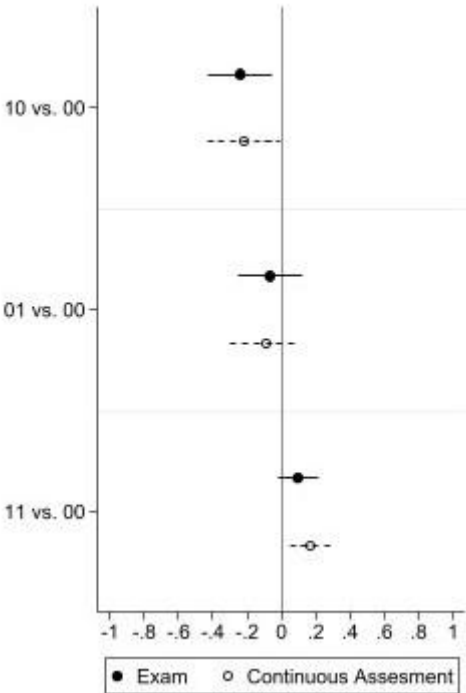
IPWRA estimates by gender show no differences between grades obtained by girls and boys in the 9th grade final exam (Figure 2). Participating in the program in the 1st year only (10) has a negative impact regardless of gender. Participating in the second year only (01) or for the whole duration of the program (11) has no effect, even if the 9th grade final examination grades of the boys who participated in the program for two years are slightly higher (and positive) than those of the participating girls. However, continuous assessment grades for boys who fully participated in the TMSO program (11) are significantly positive and higher than those for fully participant girls. In this respect, our mobility hypothesis H3b is supported in relation to gender.

Figure 3 represents the IPWRA estimates of the impact of the program for the three groups of participants according to socioeconomic background. Middle-class students benefit the most from a two-year participation in the program, especially in grades obtained in the continuous assessment, compared to non-participants. They are also the most penalized when they only participate in the first

year of the program. For working-class children, we observe qualitatively similar results, but of lesser magnitude. Consequently, our reproduction hypothesis H3a is supported in relation to class background.

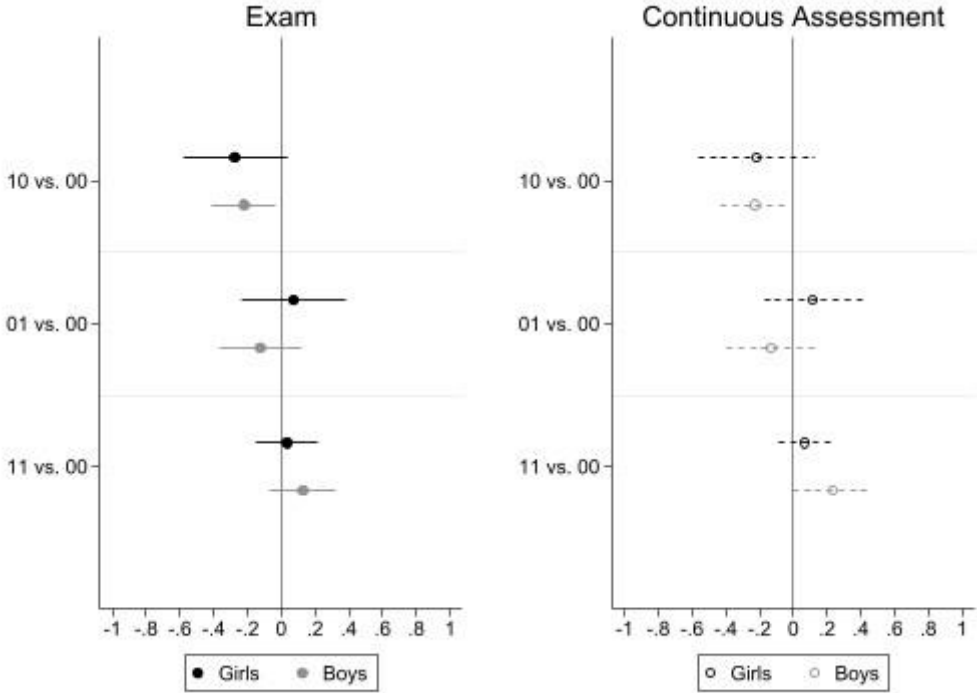
Finally, all these results tend to support the fourth hypothesis (H4), according to which the impact of the TMSO program is negative for students enrolled for the first year only, and positive for those enrolled for the whole duration of the program. This result suggests either that the program may have a detrimental impact on school achievement when attendance is stopped early or alternatively that pupils who leave the program early are negatively selected because of inappropriate behavior or poor academic performance.

Figure 1. Impact of the participation in TMSO on standardized 9th grade final exam and continuous assessment grades (ATET* estimated by – IPWRA**).



Source: FAERE database (DEPP, Ministry of Education, school years 2003-2012).
 Note: All IPWRA point estimates (with estimated standard deviations) are reported in the table in Annex A2.
 * ATET: average treatment effects on the treated
 ** IPWRA: Inverse-probability-weighted with regression adjustment

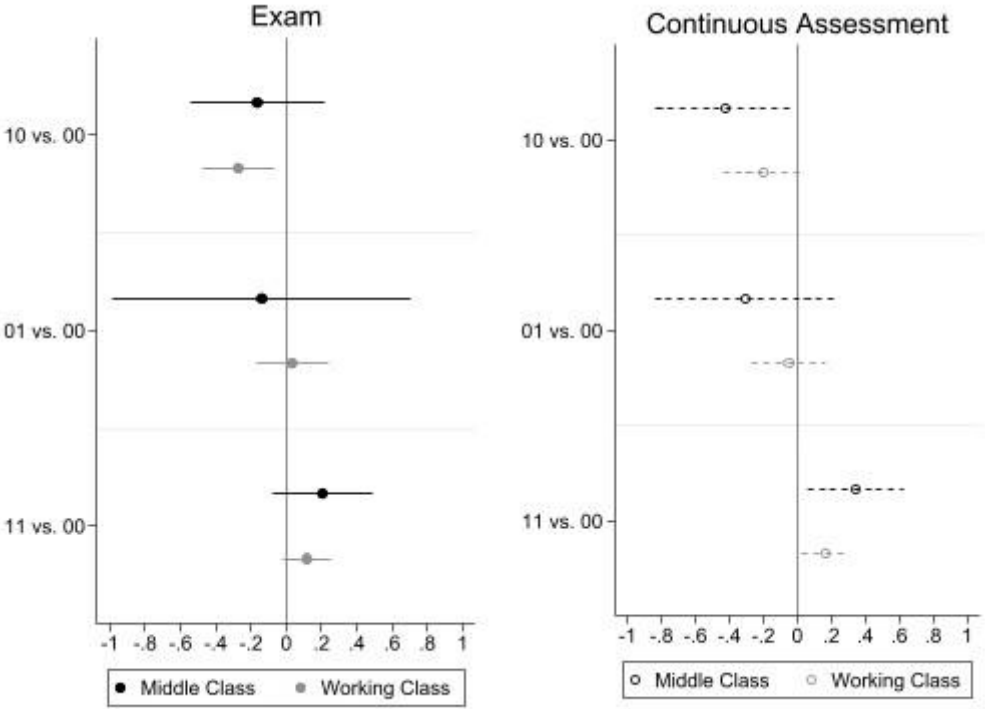
Figure 2. Impact of the participation in TMSO on standardized 9th grade final exam and continuous assessment grades by gender (–ATET estimated by IPWRA).



Source: FAERE database (DEPP, Ministry of Education, school years 2003-2012).

Note: All IPWRA point estimates (with estimated standard deviations) are reported in the table in Annex A2.

Figure 3. Impact of the participation in TMSO on standardized 9th grade final exam and continuous assessment grades according to socioeconomic background.¹¹ (ATET estimated by IPWRA)



Source: FAERE database (DEPP, Ministry of Education, school years 2003-2012).

Note: All IPWRA point estimates (with estimated standard deviations) are reported in the table in Annex A2.

VII. Discussion

Based on direct observations and interviews with teachers between 2015 and 2018, and retrospective interviews with a small number of students who participated in the program in the period corresponding to the relevant data, the rather weak though significant impact of the program might be considered composite and somewhat indirect. Moreover, the negative impact of partial participation in the program for those who leave after one year casts a rather equivocal light on its overall impact on educational inequalities.

A rather weak and mainly indirect effect of the program

The main result of the counterfactual analysis outlined in the above section is that the impact of full participation in the program (i.e., enrollment in the program for its whole two-year duration) on continuous assessment grades appears strongly significant and fairly substantial, while remaining modest. Participating in the program for its entire duration is indeed associated with a 0.17 standard-deviation increase in the continuous assessment grade (see Figure 2 and Table A in Appendix 2). By

¹¹ For the sake of simplification, the working-class category is aggregated with the unemployed and inactive category, as the latter excludes retirees and concerns those who have never had any employment. Retirees and the formerly employed and unemployed are classified according to their former occupation.

existing education policy evaluation standards, this impact can be considered low (Hattie, 2009), even when restricting the comparison to both project-based learning and arts education programs.

In addition, the nature of the impact is open to question considering the details of its implementation. The TMSO program, as has been previously mentioned, does not fully meet the criteria belonging either to the canon of arts education or to the philosophy of project-based learning. The artistic learning content of the program is rather weak. It does not imply any specific training in an artistic domain, such as playing a musical instrument, for example. The artistic workshops offered to the students focus on a fairly non-technical approach to drama, writing, drawing, video, or photography. The generally emphasized logic of skill transfer when it comes to the expected benefit of arts training is thus unlikely to be fully operative in this program.

However, as often mentioned by former students and teachers, through frequent visits to the Opera, meeting with artists and technicians, and attendance at operas and ballets, TMSO provides the students with a social and cultural openness that they would probably not experience without the program. This indirect effect of the program acts mainly at a non-cognitive level. In particular, children from disadvantaged backgrounds are recurrently given the opportunity to visit the affluent Parisian neighborhoods surrounding the Opera, as reported by this young man met in 2017 who participated in the program in 2009, when he was a student in a junior-high school in a northern suburb of Paris:

... in fact, we learned more about going to Paris, which was not a trivial thing for us, than ...hum... discovering the Opera, in fact we knew what the Opera was. Well, for the majority they knew what the Opera was, they knew what an Opera was, they knew where it was located. But we had never been to Paris specifically, so that was the shock. The first shock was arriving in Paris, those are the best memories in fact...

The criteria for project-based learning are also imperfectly met by the program. According to our observations and interviews, the program lacks a problem-solving dimension, as well as a truly systematic collaborative and autonomous logic from the students' perspective, which have often been described as critical dimensions in problem-based learning. It also implies limited collaboration between teachers, and this collaboration operates mainly outside their own teaching sessions. The program is in general only modestly integrated with the rest of the school curriculum, with huge variations depending on subject areas. Higher levels of integration are usually seen in French, history, and geography than in mathematics and biology. This discrepancy is illustrated by the following description made by a history teacher met in 2017, when she was in charge of the program in a junior-high-school in an eastern suburb of Paris:

*I like to introduce my chapters with pictures, with things ... so I can do that, but it's really minimal compared to what would be possible if I had the time. So, I do it every now and then. And last year, yes, it was already complicated, because the program is very full and as I'm their main teacher this year, I already spend a lot of time organizing everything during the history class, so that the project works well. But in French, this is where they selected all the texts they were going to study. This is where they learn them, where they understand them. In visual arts, they also do a lot of work on the posters, the invitations for the show. In Spanish, they work a lot. Because they are working on *The Barber of Seville* (...). So, in some subjects like French, Spanish, and Visual Arts in particular, they continue to work well. But afterwards, in other subjects, it's a bit more complicated.*

From the teachers' perspective, however, the participative and collaborative dimension of the program is probably of a different nature. First, participation in the program is subject to a selection process based on an application made by a team of voluntary teachers in a school, and TMSO therefore partially acts as a team building exercise among the teachers who are partially self-selected on the

basis of their professional involvement and propensity to collaborate with their colleagues. As a result, students have the opportunity to be supervised by teaching teams that are more motivated and cohesive than usual. Part of the impact of the program is thus probably channeled through this indirect effect.

In addition, the program generates specific pedagogical situations that bring together teachers from different fields in an unusual position of shared authority. In these situations, teachers also tend to develop a closer and more interactive relationship with their students.

Similarly, the particularly long duration of the program may in itself positively impact students' performances. Advocates of project-based learning have indeed pointed out for a long time that the duration of the projects is part of their overall effectiveness, since students benefit from being supervised by the same teachers for the whole duration of the program (Rugen and Hartl, 1994). In the case of TMSO, this stability effect also concerns the composition of the peer group, which, with few exceptions, remains the same for two years, something which is much more unusual for non-participating students. The positive impact of peer group stability on students' well-being and academic performance is now fairly well documented (Lavy and Sand, 2012; Ly and Riegert, 2014).

A mathematics teacher interviewed during fieldwork clearly expressed this minor though decisive component of the impact of participation in the program, when comparing the two 8th grade classes in which she taught at the time of the interview. One was participating in the TMSO program, and, for that reason, she had already been their math teacher the year before, unlike with the other 8th grade class:

... [I]n mathematics, this year in 8th grade, they have a much better level than the other 8th graders. And I think it's because I had them last year, so I know everything they've done. They can't tell me, "Ah no, we didn't learn this." "Yes, you have it in your 7th-grade notebook. Go and get it. I won't do it again." And they have acquired working methods, well, my methods, so as a result, the 8th grade runs more smoothly than the others... than my other class, where I'm the main teacher, however, and the level is much lower. So, they were used to it. The fact of following them two years in a row, they've got used to all my methods, how I work, etc. So that's great.

Another possible indirect effect of the program's duration is related to the substantial increase in the daily and weekly time that enrolled students are supervised by adults. In this respect, enrollment in the program partially shields students from some of the vagaries of adolescent life, especially in the disadvantaged suburbs where the program is predominantly implemented, thus contributing, at least in the eyes of its advocates, to the prevention of school dropout and failure.

An incident that occurred during fieldwork appears retrospectively highly emblematic of the program's role in prevention. The neighborhood of one of the junior high schools involved in the program was the scene of several weeks of fighting between rival gangs. These fights sometimes occurred in the immediate vicinity of the school. They seem to have profoundly affected teachers and students, especially since some of them were directly involved. In contrast, students who participated in TMSO were partially if not totally spared from these events, as indicated in the account given by their French teacher:

Last week, we were surrounded by kids in front of the school, who turned up with iron bars. Well, the 8th graders were... it specifically affected the 8th graders. But I asked the 8th-grade opera students, I said to them, "What happened?". And they actually didn't know much about it. Unlike my other class, which was... I thought, maybe in the end, they're so busy from 8am to 5.30pm that they didn't even see that there were fights [laughs]. They didn't seem to know about it. While my other class of 8th graders got

totally involved in it. There was even one student that I didn't see [in school] anymore, and I would see him constantly hanging out on the street. And that's just... I figure that our opera class, well I... in any case, they are not at all caught up in this problem of settling accounts after school, which nevertheless concerned all the other 8th grade classes.

The problematic meaning of the underlying mechanism

Another key finding of this study is the negative impact of partial enrollment for those who leave the program after one year, together with the differentiation of the magnitude of its impact according to students' socioeconomic background. These findings cast some doubt on the impact of the program on school inequalities and on the underlying social process it implies. With regard to the negative impact on students who leave the program before completion, it seems that a kind of selection process is at work whereby students who are less suited to the expectations of the program are implicitly discarded. Thus, the relative effectiveness of the program on the remaining students would in fact be the result of this process of pushing out the least compliant students and rewarding the most compliant. Various observations made during the fieldwork support this view. Several observations have been made of students who were excluded from the program between the first and second year, either because their behavior was inappropriate to the program or because they were suspended from their class or their school for serious misconduct. The latter cases were particularly badly received by the teachers, who seemed to see in them the limit of the "redemptive" function attributed to the program. The story of Meriam who was suspended during the program, as reported by her former math teacher, is highly illustrative of this type of situation, which, while relatively rare, is not completely unusual:

So, there was Meriam who was suspended... Who was suspended from the class because... So, we had started her on the program at the end of the 6th grade. I was her main teacher. And we said to ourselves, it's double-edged. Either the class works, and it saves her. She invests herself. Or it will be a disaster. And in fact, she immediately invested herself in the project. But on the other hand, well, she was up to all kinds of crap in the hallways. That was the problem. She was a bit... she was a bit arrogant. She was constantly provocative. And so, at the end of the year, we said, well, we will change her class because we don't want to spend another year putting up with her moods. And so, in the 7th grade, she was suspended in December or January, I would say. Yeah. December, she was suspended from school. She had brought alcohol to school, I think, the main cause. But then, there were a lot of incidents that lead up to that.

This selection process is not necessarily the result of a deliberate or even conscious intention, either on behalf of the teachers or of the Opera officials. But it echoes Bourdieu's analysis of the effects of cultural domination as presented in the reproduction thesis, since the program seems to work only insofar as the students conform to its expectations or, at the very least, do not diverge too far from them. It is also consistent with the fact that the impact of the program is more pronounced for students from middle-class backgrounds than for students from working-class backgrounds. As such, the underlying mechanism of the program's impact challenges the presumably redistributive effect associated with the mobility thesis.

Finally, some of the observations made during fieldwork shed light on the ambivalence of the forms of cultural transmission operating in the program. It is in particular often quite difficult to disentangle what corresponds to the transmission of genuine cultural contents and skills from what corresponds to more superficial forms of social "training" that are rather more evocative of learning to submit to the norms of legitimate culture than of gaining access to empowering knowledge. In this regard, the

way visits to the Opera are conducted, especially when the students are invited to attend performances among the regular Opera-going public, are quite telling.

For instance, during one of these visits, Mr. S., one of the representatives of the TMSO program at the Paris Opera, gave a certain number of instructions to the students (no chattering, no wandering, no untimely applause), insisting on "how lucky they were to be there". The question of applause is notably evoked in these terms: *"And especially, never launch the applause yourselves, you do not have the codes. Wait for the other spectators to applaud."* At the same time, the teachers interviewed during the fieldwork report with humor that the students are not necessarily fooled by this "social theater" and that it often happens, after a few months of the program and a few visits to the Opera House, that they mock the behaviors and customs they observe there, as reported by one teacher of French:

It was a pretty... pretty incredible moment last night. A kind of subtlety that was created in them. For instance, I was with five students, and two of them spent their time making jokes about social codes. They used a little precious language, like this [mimics a pinched look], and then they made little faces mimicking the so-called bourgeois and really, it was enough to die laughing. All evening, they were going on, "Madame, would you like to have supper?" "My distinguished greetings"... They were looking at the people... It was the fact of seeing the people, the ... the ushers, with their bow ties... they were a little amazed... and at the same time, they had a kind of hindsight that was really funny, because they were looking at me, "Madam, can't you have dinner with us?" I don't know... There was a whole kind of... I see them... Yeah, taking a step back, yeah, from all that. From the social codes, you know.

Conclusion

Our analysis displays a positive although modest impact of participation in the TMSO program on students' achievement in 9th grade. This impact is nonetheless limited to continuous assessment and is stronger for students from middle-class backgrounds than for students from working-class backgrounds. Furthermore, this positive impact is limited to full participants. For those who leave the program before it is over, the impact is not simply smaller, it is negative. The contribution of these findings is twofold. First, from the perspective of educational policy evaluation, they question the emancipatory and equalizing impact of project-based learning initiatives in the artistic and cultural field. Second, from the perspective of cultural capital theory, they mitigate the rather broad consensus on Paul DiMaggio's mobility thesis and give back some credit to the reproduction thesis of Bourdieu and Passeron. In any case, these findings call for further research, as much as possible based on the implementation of truly randomized control trials, which are still lacking in this area.

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Appendix

A1. Sample description

	Treatment variable				
	Non- participants	Year 1 only	Year 2 only	Years 1 & 2	
School	00	10	01	11	All
S1	84	1	4	21	110
S2	54	1	3	13	71
S3	51	1	0	17	69
S4	88	12	11	16	127
S5	71	2	1	19	93
S6	56	6	7	8	77
S7	105	4	3	18	130
S8	96	5	5	17	123
S9	173	4	5	10	192
S10	126	6	6	8	146
S11	91	4	12	8	115
S12	109	2	2	22	135
S13	266	9	9	10	294
S14	111	5	4	10	130
S15	50	4	9	10	73
S16	27	3	3	14	47
S17	91	7	8	7	113
S18	56	3	5	14	78
S19	81	5	5	17	108
S20	137	4	8	14	163
S21	114	6	3	9	132

S22	108	5	5	16	134
S23	94	3	3	14	114
S24	157	3	3	17	180
S25	155	3	2	21	181
S26	111	8	7	7	133
S27	114	0	2	16	132
S28	145	7	6	18	176
S29	136	0	2	14	152
S30	111	1	3	17	132
S31	89	2	1	11	103
S32	59	6	13	9	87
S33	98	2	0	23	123
S34	102	9	2	8	121
S35	115	2	4	16	137
S36	107	0	6	6	119
S37	106	3	10	9	128
S38	94	1	3	20	118
S39	70	4	4	12	90
S40	78	3	9	12	102
S41	83	3	3	14	103
S42	52	2	3	20	77
S43	118	4	0	13	135
S44	108	7	5	7	127
S45	89	1	4	15	109
S46	134	5	4	18	161
S47	78	2	5	16	101
S48	92	1	1	17	111
S49	89	1	2	15	107
	4929	182	225	683	6019
	(82%)	(3%)	(4%)	(11%)	(100%)

Source: FAERE database (DEPP, Ministry of Education, school years 2003-2012).

A2. IPWRA estimates of the average treatment effect on the treated (ATET)

	Full sample		By gender				By socioeconomic background			
	Cont. Ass.	Exam	Girls		Boys		Middle Class		Working Class	
			Cont. Ass.	Exam	Cont. Ass.	Exam	Cont. Ass.	Exam	Cont. Ass.	Exam
Sequence:										
(1,0) vs (0,0)	-0.221** (0.108)	-0.240*** (0.097)	-0.219 (0.177)	-0.275* (0.158)	-0.225** (0.105)	-0.219** (0.097)	-0.421** (0.209)	-0.165 (0.195)	-0.201* (0.120)	-0.273** (0.104)
(0,1) vs (0,0)	-0.093 (0.104)	-0.068 (0.095)	0.117 (0.149)	0.073 (0.155)	-0.130 (0.134)	-0.123 (0.122)	-0.303 (0.274)	-0.139 (0.432)	-0.050 (0.111)	0.032 (0.104)
(1,1) vs (0,0)	0.169*** (0.062)	0.094* (0.060)	0.067 (0.079)	0.034 (0.093)	0.235** (0.123)	0.129 (0.098)	0.344** (0.146)	0.204 (0.143)	0.166** (0.070)	0.119* (0.069)
Number of obs.	4,838	4,740	2,529	2,497	2,309	2,243	992	983	3,573	3,495

Source: FAERE database (DEPP, Ministry of Education, school years 2003-2012).

Remark: Estimated standard errors are between parentheses.

Statistical significance: * Significant at the 10 percent level, ** Significant at the 5 percent level, *** Significant at the 1 percent level.