Financial Literacy in Italy:
What works among millennials most?

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Financial Literacy in Italy:
What works for millennials*

Abstract

Nowadays, financial literacy is one of the most important skills that can be acquired by a tech-savvy millennial. In order to understand what format of financial education works best for millennials, we set up an experiment that involved implementing a financial education program called "Futuro Sicuro" on a sample of 650 high school students in Italy. The program allowed us to gather data from two treatments at the class level, namely 1) a theoretical, rule-of-thumb-based financial education program with the presence of a financial advisor, and 2) a digitized financial education program using web-based applications based on the learn-by-playing rule. The two treatments were associated with different costs but showed similar effects: three weeks after their conclusion, we find that the courses did increase actual financial knowledge and the results also aligned with participants' realistic assessments of their own financial skills. A follow-up study also reveals the persistence of these effects three months later for the first treatment (i.e. the traditional course).

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1.   Introduction

With the advent of globalization and the development of technology, the financial world has become more accessible. However accessible is not synonymous with simple. Besides stipulating mortgages, accessing credit and investing have also become actions taken by those who may not fully grasp the associated conditions and implications of such actions. Financial inclusion and consumer protection thus make financial literacy an object of interest for policymakers. In particular, it is of crucial importance to spread financial literacy among millennials who will be riding the crest of financial technology (Fintech) wave. This notion is also widely supported by the Italian economic press and several institutions. The aim of this research is to identify whether, in order to spread financial literacy among millennials, it is more advantageous to implement a traditional course or a course that exploits modern technological facilities.

Before going deeper, it is necessary to define and specify certain terms. Financial Education identifies a set of tools for improving consumer financial literacy. According to the Organization for Economic Cooperation and Development, financial literacy refers to a mix of financial and numerical knowledge and those skills necessary for good autonomous wealth management (OECD, 2005). Moreover, financial literacy allows greater rational, motivated and self-confident participation in economic life (OECD, 2014) which is an important safeguard against market instability. Finally, financial capability is the ability to put into practice one's financial knowledge and to adopt sound financial behaviors that are appropriate to one's needs. The World Bank definition provides a more technical definition, stating that financial capability is the "internal capacity to act in one's best financial interest, given socioeconomic and environmental conditions" (www.worldbank.it).

The level of financial literacy is deficient throughout the world, with only 2.1 percent of countries qualifying as top performers (PISA, 2012). According to the most recent PISA survey, young Italian students still perform worse than their peers in OECD countries. In particular, Italian 15-year-old students were 29 points under the OECD average score in 2018. As emerged, Italy is at the thirteenth position among 20 countries and economies that participated in this optional assessment (OECD, 2020). Despite recognizing the need to improve financial literacy levels worldwide, the best way to achieve this is far from

clear.

In this paper, we focus on students from a secondary school in the south of Italy (Reggio Calabria). We organize short courses in financial literacy for some of the classes of the penultimate year of a secondary school. The courses involve about 126 students in treated classes (exposed to the course). Time and budget constraints do not allow us to repeat the program for more than six classes. We collect data on more than 650 students from treated and untreated (not exposed to the course) classes. Importantly, we have quasi-experimental variation in exposure to courses because there is no particular selection of students into classes (the allocation of students into classes is random). Consistently with this, we find balanced observable characteristics of students both in the treated and untreated classes.

The financial courses are of two different types. The first one is delivered traditionally. It consists of four in-person lessons by a teacher and a financial advisor using slides. The second one is delivered in a highly digitized way through the platform "Kahoot" following the same schedule. The main difference between the two treatments is that the digitized course involves the learn-by-playing concept whereas the other is a more traditional classroom course. In the digitized course, students answer short quizzes on an interactive multimedia whiteboard that can be accessed via their smartphones. They are also able to verify and improve their knowledge by watching short videos freely available on the official website of the Museum of Saving[2] (*Museo del Risparmio*).

Besides these, a tracking task is part of both treatments. The task requires students to track their expenses digitally or traditionally, depending on their course type. A prize, valued at around 10 EUR, acts as an additional incentive for students to perform well.

The contribution of the paper to the existing literature consists of the investigation of the effects of two financial literacy courses similar in terms of their content, duration and goals but very different with respect to their method of dissemination. To the best of our

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[2] The Museum of Saving is not a traditional museum but rather a place in which technology, interactivity and games are used for educational purposes. In particular, "edutainment" and gamification are used to spread financial literacy. Videos are available at the following link http://www.museodelrisparmio.it/edupop-la-nuova-educazione-finanziaria/ (last visited on March 20th, 2020).

knowledge, this is the first paper to focus on this particular population (Italian millennials) within a quasi-experimental setting comparing the potential of digital learn-by-playing methods and traditional instructor-driven rule-of-thumb[3] methods to increase financial literacy.

High school students in Italy are a relevant target group for financial literacy courses for several reasons. Firstly, the age range (between 16 and 18 years) is among the most interesting for examining the impact of a long-term early-impact targeted policy measures. High school students are not yet economically independent, have lower financial exposure in comparison with university students and are highly motivated to attain financial freedom as soon as possible. Their intrinsic motivation pushes them to engage in a meaningful way thus enabling a conducive environment for the introduction of a financial education program. Our data collection and experimental study was facilitiated by the the fact that students in our sample are enrolled in a school that randomly assigns them to different classes and the school stores personal details and marks for each student within each subject.

In the paper by Brugiavini et al. (2018) a different subgroup of millennials is targeted for financial literacy, both in terms of interests and in terms of their age. However the advantages highlighted by them (such as essential math ability, heterogeneity, low financial exposure) are reasonably applicable also to our target population. Both targets are able to do simple calculations required by minimum financial literacy standards. Homogeneity is ensured not only in age but also in the area of residence. In comparison to university students, high-school students in Italy have little exposure to the financial concepts that allow for sound wealth management. For this reason, courses in financial education could have a significant impact on their financial skills. The implementation of the different treatments in the familiar environment of the classroom in which students are already accustomed to learning also further enhances the impact of our treatments.

Through our experiment, we provide two key findings. First, our results indicate a positive effect of financial education on financial literacy. After the course, the treated students appear more financially literate than before in comparison with the control group. Second, following a short course on financial education, there is a reduction in

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[3] The costs of each course would be similar if financial advisors are free of charge. However, the traditional course requires a lot of effort in comparison to the digitized one.

self-assessed financial literacy, which may suggest a better alignment with actual financial literacy.

The paper is organized as follows. Section 2 reviews the relevant literature review on financial literacy. Section 3 describes the research design and methodology. Section 4 provides some preliminary analysis. Section 5 details the main results. Section 6 concludes.

2.   Literature

It has been widely demonstrated that individuals are not able to cope with the complex financial situations around them (Lusardi et al., 2014). It is from this awareness that both scholars and politicians have shifted their focus to the need to spread financial culture and to study the determinants of financial decision-making (OECD, 2005; Lefevre and Chapman, 2017).

Several scholars consider financial literacy akin to human capital investment, both of which are geared toward eventually achieving higher earnings. Among them, Jappelli and Padula (2011) have studied a multi-period life cycle model in which financial literacy is considered endogenous and hump-shaped. They have argued that the relationship between financial literacy and wealth is strongly correlated over the life cycle, except after retirement. An important conclusion suggested by these authors is that since financial literacy is similar to an investment, there could be sub-groups for which it would require unacceptably high costs. In this regard, the OECD has stressed the importance of increasing literacy for new generations starting right from primary school or ideally from kindergarten (OECD, 2005; OECD- International Network on Financial Education - INFE, 2012) where it would be possible to take advantage of the time period during which people tend to be particularly receptive. Another interesting aspect is the positive relationship between financial literacy and education. Lusardi and Mitchell (2011) have argued that young adults who attended college understand complex concepts such as financial diversification compared with those who did not. Empirical evidence shows that providing financial knowledge to the least educated group improves their

wellbeing by 82 percent in the pre-employment stage and 56 percent for college graduates (Lusardi et al., 2011).

Moreover, there is empirical evidence which has also shown a gender gap (Lusardi et al., 2014). They suggest that while women are less financially literate, they are also those who most often recognize their limits in this field by choosing more often "do not know" as a response (47% women against only 26% of men in the US).

As can be seen in the literature, a solution must be found to increase the protection of wealth. Protecting wealth also means safeguarding savings and having the ability to evaluate when it is convenient and how much it costs to borrow money. In fact, it is widely demonstrated that people with low financial literacy pay high transaction costs and excessive interest rates (Lusardi and Tufano, 2009).

The goal of financial education programs should be (according to the International Network on Financial Education - INFE) the acquisition of expertise in the following areas: money and transactions, financial planning and management, risk and performance and basic numerical skills and knowledge of the financial system (terms and roles). The effect of financial education on behavior should be investigated and evaluated, proving effectiveness through counterfactual techniques that involve a comparison between beneficiaries (treated group) and a group of people similar in other respects to the treated group but who do not follow any financial education course (control group).

However, while financial literacy programs are targeted at many groups, the existing literature provides little evidence on the effects of these programs. The most critical issue to consider is that financial education programs often lack an evaluation as part of the design. Among them, for school-age students, see Bruhn et al. (2016) for Brazil, Romagnoli and Trifilidis (2013), Frisancho (2018); for Italy, for working professionals, see Bernheim and Garrett (2001), Clark and d'Ambrosio (2008) and Clark et al. (2012a, 2012b); for household literacy programs, see Collins and O'Rourke (2010). Notable exceptions are Becchetti et al. (2013) and Lührmann et al. (2015) and Frisancho (2018), who assess the effect of financial education programs on high-school students, and Brugiavini et al. (2018) on University students. More in detail, Lührmann et al. (2015), as well as Frisancho (2018), find a positive impact of short training sessions on financial

attitudes such as interest in financial matters and saving propensity. In contrast, Becchetti et al. (2013) do not find any statistically significant effect of the treatment on financial literacy. Besides these, Brugiavini et al. (2018), focusing on 579 university students, also find that a short one-day course increased more self-assessed financial literacy in comparison with the actual increase in knowledge. Taken together, a positive impact of such programs on hypothetical behaviors emerges.

Several scholars argue that by playing, children retain knowledge (Dau, 1999; Levin, 1996, Pramling Samuelsson et al., 2008). Levin (1966), claims that during play, children become aware of what they know and assume control of what is happening. In addition, the school involved seems to follow the principles stated by the Swedish preschool curriculum (Ministry of Education and Sciences in Sweden, 1998) since the environment is joyful, gives students a feeling of belonging and mixes communication, play and learning as a whole during the yearly activities. Finally, Johansson et al. (2006) argue that in such an environment, children exchange their ideas learning by each other through discussions, argument and exploration.

To the best of our knowledge, no studies in the literature are focused on the effect of learning-by-playing in financial education for high school students. However, three studies in the literature are similar to our set up. The first one is a traditional financial education program called "Finanzas en mi Colegio" (Frisancho, 2018), conducted on a large-scale using counterfactual techniques and a comprehensive evaluation strategy. It involved 300 schools in Peru and the main result is increased savings behavior both for students as well as teachers. The quantitative impact of this financial education program is 0.14 standard deviation (SD) in real knowledge on average in the pooled sample of students. In addition, not only do students learn more but they also become more aware of their financial proficiency (0.11 SD). According to Frisancho (2018), this study is the first one which includes a cost-benefit evaluation in this context. They found that their intervention is cost-effective. In fact, on a sample of 31,000 students in 150 schools, they spent US$ 6.6 per student and the cost-effectiveness ratio was 0.021. In the end, they point out that every dollar spent per student is equivalent to a 2.2 point improvement in the PISA 2015 financial literacy test. The second financial literacy field experiment of interest is conducted in the north of Italy by Brugiavini et al., (2018). It is an intensive short course in which university students are interviewed before and after being exposed

to financial education videos on the same day. On a sample of 579 university students, the statically significant effect on financial knowledge was 0.046 for "Inflation" after the course, 0.176 for "Interest compounding" and no effect emerged for the "Diversification" outcome. However, the number of correct answers after the course increased by 0.229. The main results are that this kind of course increases both real as well as perceived financial knowledge, but the latter increases more quickly. The similarity with our study is that we also use a short period of learning (though relatively longer compared to previous studies) and the use of videos. In the end, the tablet-based program introduced by Attanasio et al. (2019), studied an all-female sample and involved a conditional money transfer program (CCT) in Colombia. Their program had a significant positive impact on knowledge, attitudes, practices and financial performance. Among the users who showed an increase in financial health over two years later, those who benefitted most were the poorest, least educated and most rural populations. The impact on the treatment group is 0.20 SD immediately after the program, and it is persistent seven months later 0.18 SD, as well as two years later, with 0.14 SD higher compared to the control group for the basic test. In the next section, we explain in detail the characteristics of our "Futuro Sicuro" field experiment.

3.   The Field Experiment

A field experiment must meet six key factors: the nature of the subject pool, the nature of the information that the subjects bring to the task, the nature of the commodity, the nature of the task or trading rules applied, the nature of the stakes and the nature of the environment that the subject operates in (Harrison and List, 2004). Following these criteria, our financial education program not only can be considered a field experiment but can also be considered a *natural field experiment* since it is set in a school which is is the most natural environment in which students learn. In addition, for these students, it is not unusual to be involved in external activities since the school frequently adopts actions promoted by different local or national stakeholders. For this reason, we can assume that the subjects in our sample are not aware that they are in an experiment.

Having reviewed all the initiatives implemented by many banking and non-banking parties (Franceschi et al. 2017), we have developed a program in line with what has already done for extrinsic parameters (like mean duration and general content). The target

is 16 to 18-year-old students attending the fourth classes of the "da Vinci" Scientific High School in Reggio Calabria. This target group is able to follow key financial concepts like students of fifth classes, but also allows us to expand the study the following year. The experiment involved 6 treated and 28 untreated classes, chosen randomly. The treatment is the exposure to the financial course that can be the traditional or the digitized one (henceforth T and D). We randomly assigned different treatments (T and D) to the treated.

We describe the timeline of the experiment in Figure 1. Before the start of the course (t_0 in Figure 1), we measure the level of financial literacy with a questionnaire for students in T, D and the untreated classes (henceforth, C). Specifically, students are required to answer questions about their personal characteristics and family background in the first section, their financial habits (such as saving habits and use of prepaid cards) and risk aversion behavior in the second section[4], and their financial literacy (inflation, interest and diversification) in the last one.

One week after the survey (t_1 in figure 1), the courses T and D started, with 2-hour lessons once a week. Attendance is compulsory because it falls within school hours. We ask students in T, D and C (untreated classes) to fill the same questionnaire again at the end of the course (t_2). We repeat the same procedure (i.e. asking students to fill the questionnaire) three months later (t_3) but only for students in the T and D classes.

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[4] Since the effect of risk aversion is strictly linked to financial behavior, we report the two questions addressed to the students that concern their risk aversion and preferences below:
Question 1: "If you win the lottery an amount corresponding to your family's annual income will be paid to you in a year. To what extent would you give up part of the amount to withdraw the residual amount immediately?
a) I would give up 20% too b) I would give up 10% c) I would give up 5% d) I would give up only 2%"
Question 2: "If you could choose from the following options, which would you prefer?
a) a certain gain of 5% b) flip a coin by gaining 10% if it comes heads, 0 if it comes cross".

Figure 1 – Study Timeline

Study Starts

Measurement of the outcome
For all classes treated and untreated

Baseline Survey
for other untreated classes

t_0 t_1 t_2 t_3

t

3 weeks after 3 months after

Baseline Survey
for all classes treated and untreated

Measurement of the outcome
For all classes treated and untreated

Study Ends
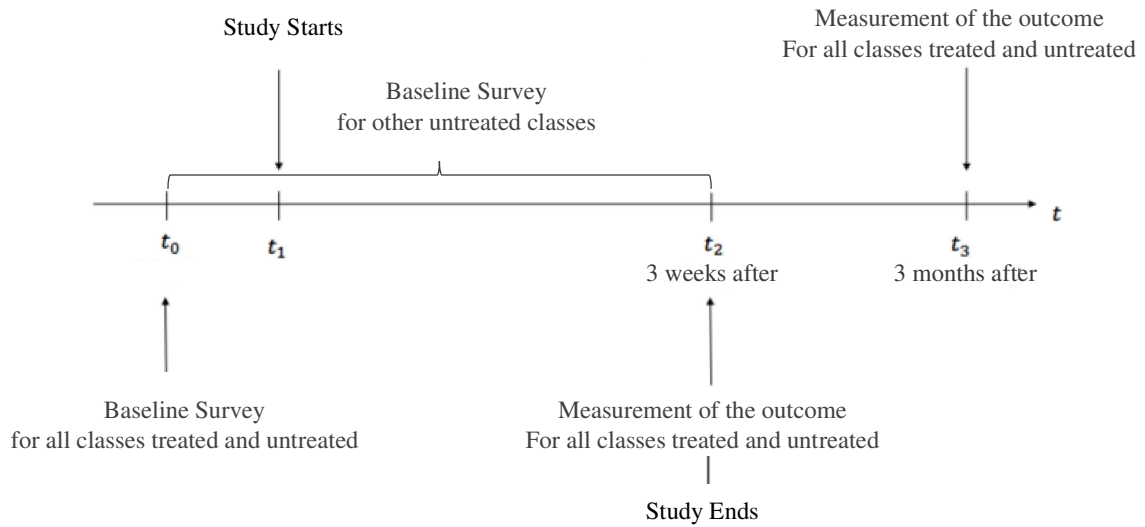
Additionally, we assign a tracking task to each treatment group which requires them to make notes of their expenses. Thus, we distribute a pre-printed sheet to the treated of the theoretical course (T treatment). Instead, to the treated of the digital course, we ask to download a free app called 70.20.10 (available for both iOS and Android devices until October 2019) to keep digitized track of their expenses. For both of them, we set the deadline to complete the task at the end of the course. This task allows us to evaluate the degree of participation of students.

Furthermore, it enables us to understand which method is more effective for millennials to keep track of their expenses. Finally, it allows us to know whether these methods succeeded in changing saving habits or their interest and consequently their knowledge. In order to increase participation, we promise a prize consisting of a handmade credit card holder (valued at around 10 EUR) to those who were able to achieve the course's requirements.

The traditional course is characterized by the presence of professional financial advisors (in three T classes). The first lesson of the traditional course is a motivation lecture about the importance of increasing human capital to increase their awareness and their involvement in the learning process as a whole, not only for the course. Then, we explain the task (giving them a balance sheet) introducing the importance of planning in wealth management as well as in everyday life. We use slides to keep things simple enough and

to allow the financial advisor to introduce examples focused on investments (i.e., planning, diversification and so on). Price and inflation are the main topics of the second lesson. The third lesson is about saving and payment instruments, taking into account inflation and refreshing the concept of simple interest calculations. The fourth and last lesson, after an overview of financial markets, is a brief introduction to mortgages, insurance and retirement.

We follow the same schedule for the digitized course. To the best of our knowledge, this is the first short course in financial literacy that covers all the major topics concerning wealth management using this particular digitized methodology. Since the aim of the digitized course (in three D classes) is to learn by playing, we show a video on human capital and we explain the details of the course and the task structure. Then, through a user-friendly platform called Kahoot, we administer the first short quiz (10 questions) about financial planning. The quiz is projected on an interactive multimedia whiteboard. Using computers or smartphone as pushbuttons, students could join by choosing their nickname and entering a unique code (automatically randomly generated every time a quiz starts). Next, a classification in comparison with their schoolmates appears. Short videos that are freely available on the official website of the Museum of Saving about financial planning are projected after each quiz. A Q&A section follows at the end of each lesson.

The design of the field experiment allows us to test three main hypotheses. The first regards the effectiveness of the financial courses. The second one is about any change in self-assessed Financial Literacy (FinLit), about the last regards the existence of a gender effect.

3.1 Descriptive Statistics

The sample comprised a total of 650 students, 126 treated (61 in the T treatment and 65 in the D treatment) and 524 untreated.

Before starting the courses, we created a three-section questionnaire following the Lusardi and Mitchell (2011) approach – Simplicity, Relevance, Brevity and Capacity To

Differentiate. We administered it both to the treated (in the T and D classes) and to the students in the untreated classes (C). In the first section, we collected students' personal information, family background, whether the student is an only child or not, the educational experience of family members and individual marks obtained in English, Italian and Mathematics during the year. In the next two sections, we collected data useful for testing our hypotheses about their saving habits and their financial literacy levels. These sections were administered before the courses, just after the course and three months after the end of the courses. In these sections, we introduced questions concerning the main topics of financial planning, inflation, diversification and interest calculation to evaluate students' financial knowledge. The same financial literacy questions (but arranged in a different order, as suggested by Lusardi and Mitchell (2009) and Van Rooij, Lusardi and Alessie (2011)) were also administered after the course. In addition, the second time it was filled out, there were new questions aimed at understanding if the treatments had any positive externalities in their everyday life. This allowed us to test H3. After discussing practical examples of daily life with the help of financial experts or through a learn-by-playing approach, we also wanted to understand if the students spoke about the project with family which might further amplify the positive effects of the course. In the end, comparing answers of the control group to the treated groups in the second and the third wave would enable us to ascertain any learning effects.

As mentioned before, there are two treated groups and one control group. Students in the treated groups received either training D (digitized course) or T (traditional course). Students in the control group C did not receive any training but participated in the survey. The experiment was conducted at the class level. In other words, we had classes in which all the students were treated and classes in which all students were untreated.

Before estimating a model, we want to stress that we have a quasi-experimental variation. The identifying assumption in model 1 is that students are assigned to treatment D or T (or to the control group) randomly. Since the randomization is done at the class level with a few classes, this assumption is equivalent to the random assignment of students into different classes. Conversations with the principal of the school and the teachers revealed that students are indeed allocated to different classes randomly and so we should not observe, for instance, some classes with a disproportionate number of high ability students. To support our assumption, we conduct a balancing test where we report for the

three groups (T, D or Control) the average characteristics of all observables at the student level.

Table 1 - Balancing Test: Personal characteristics

	(1) Treated group	(2) Traditional Course	(3) Digitized Course	(4) Control group	Diff1 (2) - (4)	Diff2 (3) - (4)	Diff3 (2) - (3)	Diff4 (1) - (4)
Female	0.524	0.459	0.587	0.472	-0.013	0.116*	0.128	0.052
	(0.050)	(0.502)	(0.496)	(0.500)	(0.067)	(0.066)	(0.089)	(0.050)
Age	16.59	16.58	16.60	16.82	-0.238***	-0.217***	-0.019	-0.227***
	(0.555)	(0.561)	(0.555)	(0.529)	(0.076)	(0.073)	(0.1)	(0.055)
Income	0.629	0.661	0.6	0.601	0.060	-0.001	0.061	0.027
	(0.485)	(0.473)	(0.494)	(0.490)	(0.063)	(0.065)	(0.087)	(0.049)
Foreign	1	1	1	0.982	0.017***	0.017***	1	0.017***
	(0)	(0)	(0)	(0.130)	(0.017)	(0.006)	(0)	(0.005)
Foreign Parents	0.968	0.967	0.969	0.94	0.026	0.028	-0.003	0.027
	(0.176)	(0.181)	(0.174)	(0.237)	(0.025)	(0.024)	(0.031)	(0.018)
Only Child	0.166	0.147	0.184	0.131	0.017	0.053	-0.037	0.035
	(0.374)	(0.357)	(0.391)	(0.337)	(0.047)	(0.050)	(0.050)	(0.036)
City Centre	0.861	0.88	0.844	0.889	-0.007	-0.045	0.037	-0.027
	(0.346)	(0.326)	(0.366)	(0.314)	(0.044)	(0.047)	(0.062)	(0.034)
Repetition	0.008	0.016	0	0.018	-0.001	-0.018**	0.016	-0.009
	(0.090)	(0.128)	(0)	(0.133)	(0.017)	(0.006)	(0.016)	(0.010)
Economics	0.15	0.193	0.111	0.116	0.077	-0.005	0.081	0.033
	(0.358)	(0.398)	(0.316)	(0.320)	(0.054)	(0.042)	(0.066)	(0.035)
Father Degree	0.369	0.339	0.4	0.321	0.018	0.078	0.061	0.048
	(0.484)	(0.477)	(0.494)	(0.467)	(0.065)	(0.067)	(0.089)	(0.048)
Mother Degree	0.418	0.439	0.4	0.357	0.082	0.043	0.038	0.061
	(0.495)	(0.501)	(0.493)	(0.480)	(0.069)	(0.064)	(0.090)	(0.049)
Father Freelance	0.411	0.517	0.312	0.343	0.173**	-0.032	0.205	0.068
	(0.494)	(0.504)	(0.467)	(0.475)	(0.069)	(0.063)	(0.089)	(0.049)
Mother Freelance	0.11	0.069	0.15	0.2	-0.131***	-0.05	-0.081	-0.089***
	(0.314)	(0.255)	(0.360)	(0.4)	(0.038)	(0.050)	(0.057)	(0.034)
Observations	126	61	65	524	585	589	126	650

Note: The "Diff" columns report the mean differences between groups with robust standard error in parentheses.
***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Table 1 shows that students' personal characteristics are quite balanced. Although the differences in age between both groups of treated and the control group are statistically significant, the size of this difference amounts to just a few months and so there is no reason to believe that this particular difference would distort our results in any way. The same can be said for the difference in repeating the school year or the difference in the number of students with foreign parents between the digitized treatment group and the control group. The statistically significant differences that emerge from the comparison between the traditionally treated and the control group regarding parent's freelance activity were however controlled for in the analysis. The difference may have resulted from the large sample size difference between the treated and control groups.

Table 2 - Balancing Test - Knowledge on financial literacy before the course

	(1) Treated Group	(2) Traditional Course	(3) Digitized Course	(4) Control group	Diff1 (2) - (4)	Diff2 (3) - (4)	Diff3 (2) - (3)	Diff4 (1) - (4)
Inflation	0.444	0.229	0.554	0.420	-0.190***	0.134**	-0.098	0.015
	(0.498)	(0.424)	(0.501)	(0.494)	(0.058)	(0.065)	(0.088)	(0.049)
Interest	0.587	0.59	0.584	0.609	-0.019	-0.024	0.005	-0.033
	(0.494)	(0.495)	(0.496)	(0.488)	(0.066)	(0.065)	(0.088)	(0.048)
Diversification	0.72	0.672	0.754	0.683	-0.011	0.071	-0.093	0.024
	(0.450)	(0.473)	(0.434)	(0.466)	(0.063)	(0.057)	(0.080)	(0.045)
Math	6.99	7.016	6.969	6.660	0.356**	0.309*	0.047	0.363***
	(1.167)	(0.999)	(1.310)	'(1.569)	(0.146)	(0.176)	(0.207)	(0.124)
Italian	7.232	7.1	7.353	7.219	-0.119	0.135	-0.253	0.017
	(1.032)	(0.969)	(1.081)	(1.058)	(0.133)	(0.141)	(0.183)	(0.103)
English	6.927	6.983	6.875	7.046	-0.063	-0.171	0.108	-0.097
	(1.134)	(1.049)	(1.214)	(1.366)	(0.147)	(0.162)	(0.203)	(0.117)
Observations	126	61	65	524	585	589	126	650

Note: The "Diff" columns report the mean differences between groups with robust standard error in parentheses.
***p < 0.01, **p < 0.05, *p < 0.1.

Table 2 makes it possible to assume that financial knowledge among students is quite balanced before the course. We also collect data about abilities in subjects related to this field and we control for math abilities. In the following sections, we present preliminary analysis and results based on the data described above.

4. Results

In exploring the real financial knowledge data collected, we analyze them in two steps reported in Sub-sections 4.1 and 4.2, respectively. The first step is a preliminary analysis of the Big Three questions shares three weeks after the course. In doing so, we test their differences in each group using T-tests and show them graphically. Then, in Section 4.2, we report results from a diff-in-diff probit regression in which we control for several observable characteristics. In the next section, we extend the diff-in-diff probit model to analyze the effects of the treatment on perceived financial literacy.

4.1 Preliminary results

We conduct a preliminary analysis starting from considering the share of inflation, interest and diversification outcomes three weeks after the course. Then, we also show these results graphically.

Table 3 - Treatment effects: outcomes three weeks after the end of the course

	(1) Treated Group	(2) Traditional Course	(3) Digitized Course	(4) Control group	Diff1 (2) - (4)	Diff2 (3) - (4)	Diff3 (2) - (3)	Diff4 (1) - (4)
Inflation	0.788	0.744	0.823	0.505	0.24***	0.318***	-0.077	0.284***
	(0.409)	(0.440)	(0.385)	(0.5)	(0.068)	(0.054)	(0.080)	(0.046)
Interest	0.807	0.894	0.742	0.609	0.285***	0.133**	0.151**	0.198***
	(0.396)	(0.311)	(0.441)	(0.488)	(0.05)	(0.06)	(0.072)	(0.044)
Diversification	0.889	0.916	0.869	0.733	0.183***	0.135***	0.047	0.156***
	(0.314)	(0.279)	(0.340)	(0.442)	(0.045)	(0.048)	(0.059)	(0.036)
Math	7.459	7.187	8.136	7.351	-0.164	0.784***	-0.546**	0.093
	(1.227)	(1.276)	(1.125)	(1.234)	(0.318)	(0.246)	(0.215)	(0.123)
Italian	7.549	7.437	8.045	7.645	-0.208	0.399*	-0.422**	-0.067
	(1.084)	(1.03)	(0.95)	(1.055)	(0.257)	(0.208)	(0.192)	(0.108)
English	7.221	7	7.31	7.552	-0.552**	-0.234	-0.133	-0.358
	(1.109)	(1)	(1.129)	(1.22)	(0.247)	(0.247)	(0.200)	(0.113)
Observations	126	61	65	524	585	589	126	650

The "Diff" columns report the mean differences between groups with robust standard error in parentheses.
***p < 0.01, **p < 0.05, *p < 0.1.

Three weeks after the courses, we administered the same questionnaire to both the treated group as well as to the control group. Comparing the results before (Table 2) and after the course (Table 3), it may be possible to argue that both courses were effective at increasing financial knowledge.

After the course, students in the traditional treatment (T), had a higher probability of answering the inflation question correctly by 24 percentage points (p.p.) in comparison with the control group. Similarly they were 18 p.p more likely to correctly answer the question on diversification and 28 p.p more likely to correctly answer the question oninterest outcomes. Attending the digitized course also had a positive effect, but in comparison to the tradition course, this effect was larger only in the case of the inflation question. Compared to the control group, students in the digitized course (D) were 31 p.p, 13 p.p and 13 p.p more likely to correctly answer the questions on inflation, diversification and interest, respectively. This is worth noting for future policies that aim to improve financial literacy in the shortest possible period at the lowest possible cost.

This can further be seen from the bar graphs depected in Figures 2, 3 and 4. These charts depict a clear picture of the differences in the share of correctly answered questions before the courses, three weeks after the courses and three months after the end of the courses for each group.

The most relevant measure is the persistence of the effects three months after the end of

the courses. Figure 1 highlights not only the persistence of the effect but also an increment in inflation knowledge three months after the course for the traditional group. The digitized course, on the other hand, seems to lose effectiveness three months after the end of the course. However, the share of the right answers is still higher in comparison to before the course (see Figure 2). The results of the control group also seem to suggest a spillover effect which would mean that the treatment effects reported here are underestimated.

The interest outcome in Figure 3 highlights an increased and persistent knowledge both three weeks and three months after the courses for the treated groups. However, since these students are attending a scientific high school, they become more proficient at math calculations over the course of a few months. Figure 3 shows not only the persistence of the effect for both groups but also an increment in interest calculation ability for the digitized group three months later.

In contrast to adults, millennials understand the diversification concept better and the inflation concept less. Analyzing diversification outcomes (Figure 4) before and after the course, a ceiling effect might be affecting the statistical significance of the results for the digitized group. However, an increase in the share of right answers in the traditional treated group can be observed in comparison to the other groups.

The effectiveness of both courses is persistent after three months, even if it is slightly reduced for both treated groups (more so in the case of the digitized group).

Figure 2: Inflation

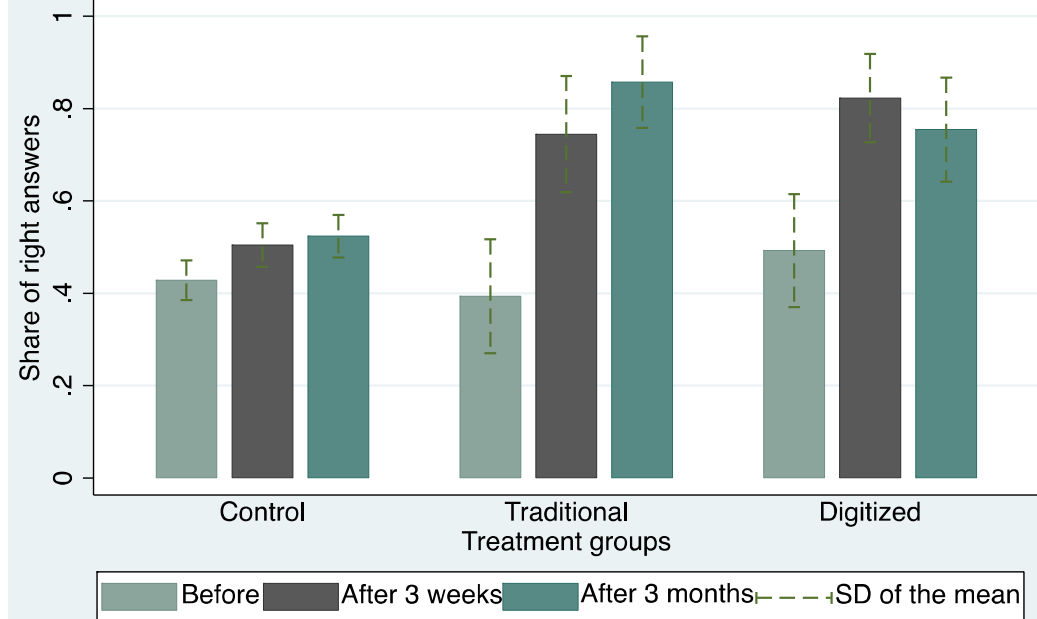Knowledge before, three weeks and three months after the course for each group
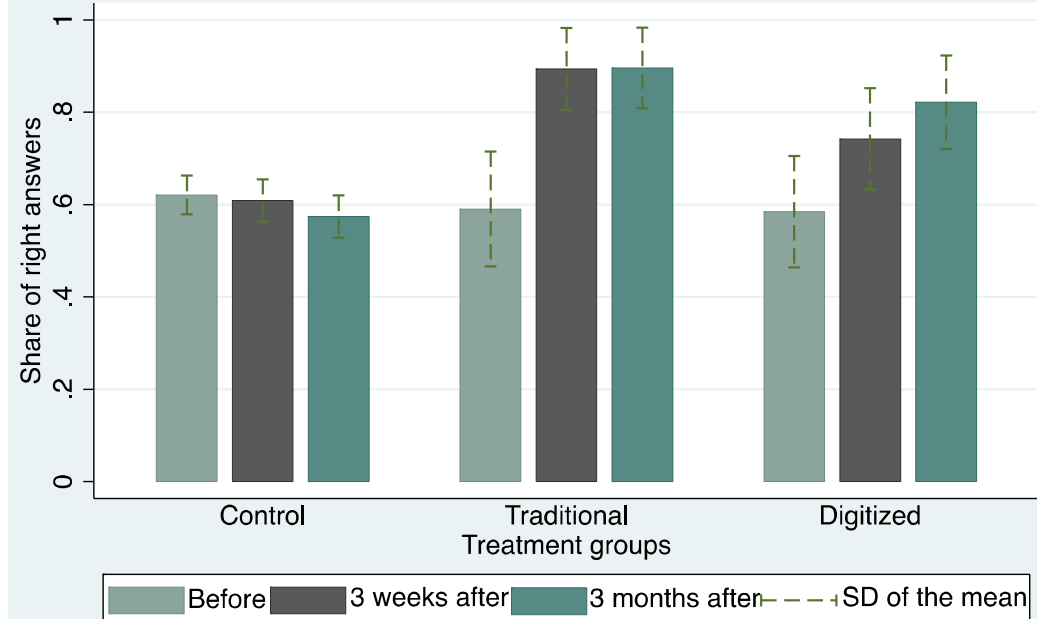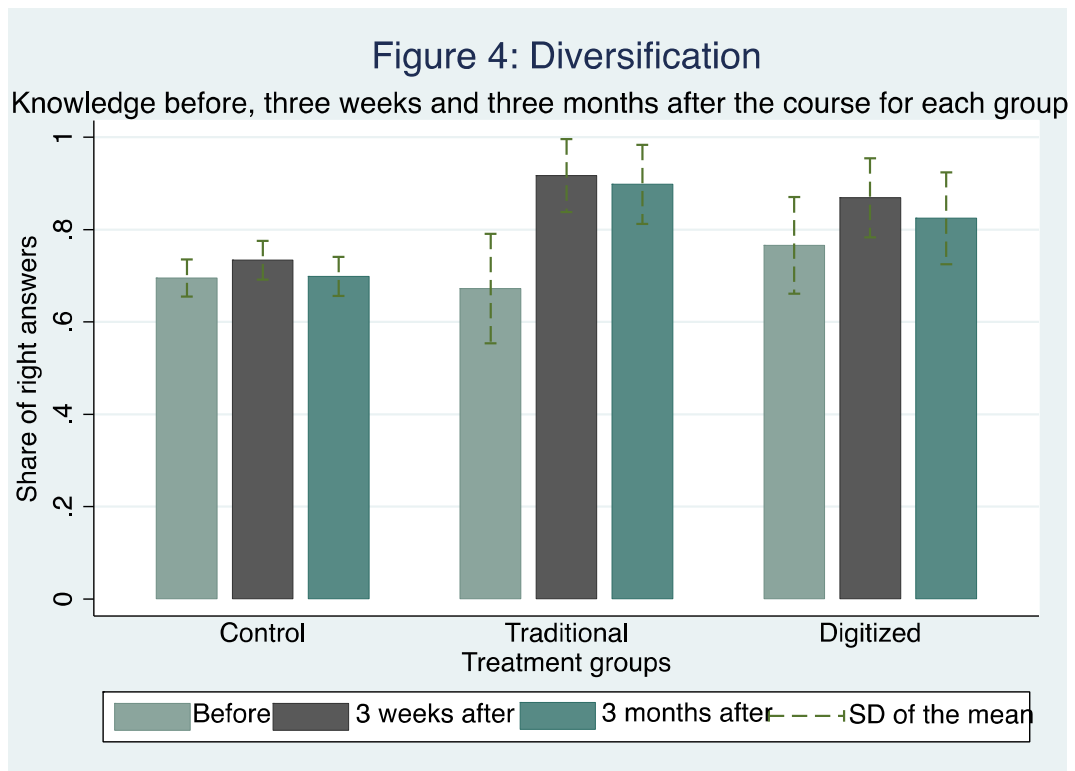

Figure 3: Interest

Knowledge before, three weeks and three months after the course for each group
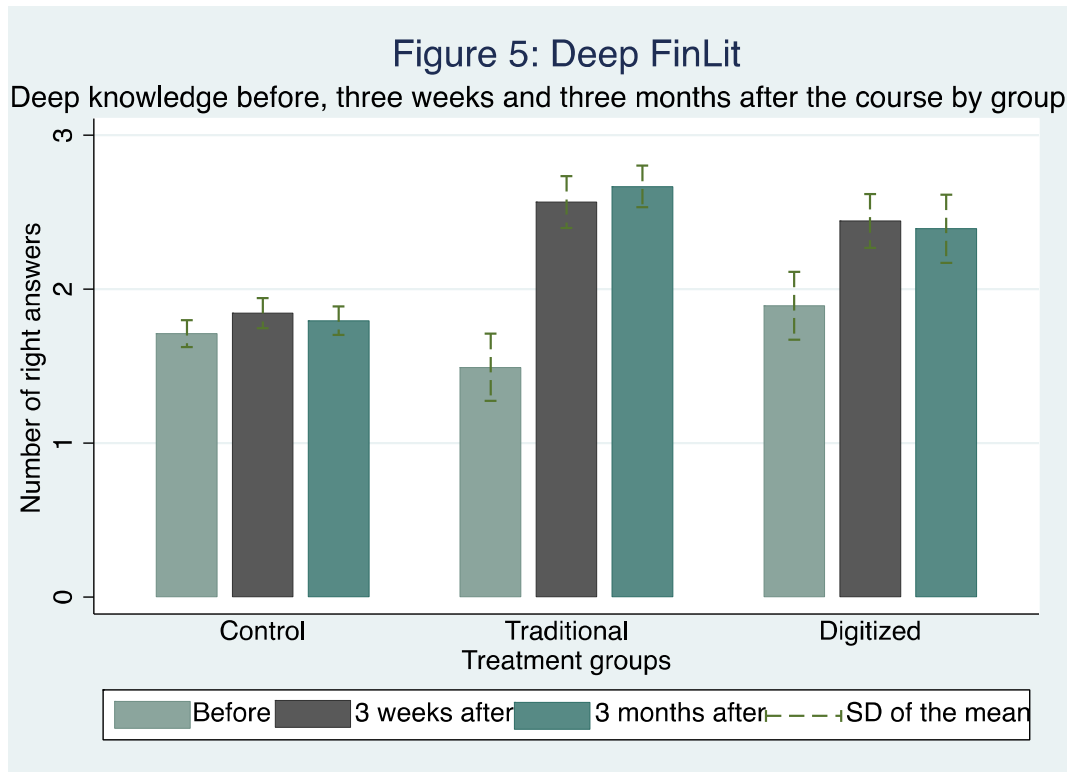
Figure 4: Diversification
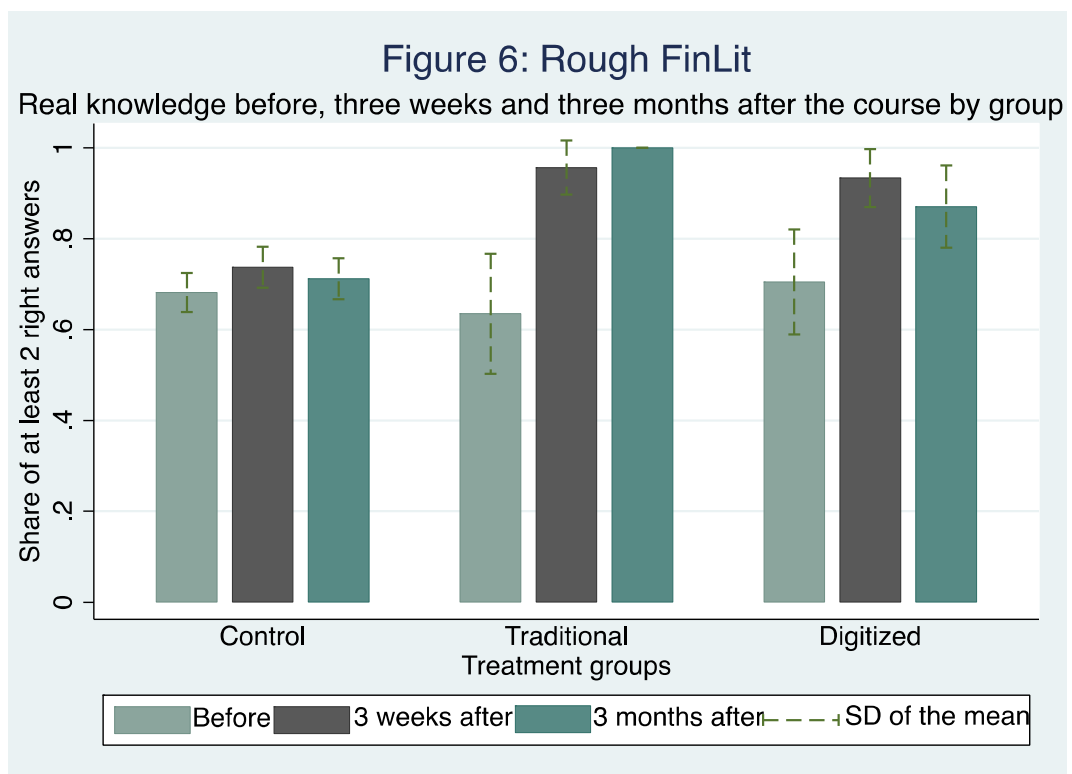Knowledge before, three weeks and three months after the course for each group

Moreover, looking at an aggregate measure of financial literacy knowledge, we create a financial literacy index (*Deep FinLit*). It is the sum of the big three5 financial literacy questions regarding inflation, interest and diversification. This index takes the value 0 if no question is answered correctly, 1 if at least one question is answered correctly, 2 if two questions are answered correctly and 3 if all three are answered correctly. Comparing this index before and three weeks after the course reveals that the share of students who respond correctly to all the three questions went from 22% to 60% (14 to 28) for the traditional group and from 38% to 54% (24 to 33) for the digitized group. This is another way to see the results of this financial education program. The same can also be seen from Figure 5. It appears that this share remains quite stable also three months after the end of the course.

5 As are called the following questions: 1) "Suppose you had $100 in a savings account and the interest rate was 2% per year. After 5 years, how much do you think you would have in the account if you left the money to grow?" A) More than $102 B) Exactly $102 C) Less than $102 D) Don't know E) Refuse to answer 2) "Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, with the money in this account, would you be able to buy…" A) More than today B) Exactly the same as today C) Less than today D) Don't know E) Refuse to answer 3) "Do you think the following statement is true or false? Buying a single company stock usually provides a safer return than more stocks of different companies." A) True B) False C) Don't know D) Refuse to answer

Figure 5: Deep FinLit

Deep knowledge before, three weeks and three months after the course by group

Next, as a robustness check, we create a dummy variable to identify their rough level of financial literacy. The variable takes the value 0 if they respond to zero or only one question correctly and 1 if they answered correctly to more than one question.

Figure 6: Rough FinLit

Real knowledge before, three weeks and three months after the course by group

As we can see from Figure 6, it is clear that the rough financial literacy increased for both treated groups.

To conclude, the aggregate measure of financial literacy outcomes after three months confirms the persistence of the treatment but since there is also a positive increment in the share of right answer for the control group, it might be considered as a lower bound due to the spillover effect. We further note that the traditional course seems to shows a higher effect three months after the course in comparison to the digitized one.

4.2 Regression Analysis

The design of the experiment allows us to use a diff-in-diff analysis. In this approach we can relax the assumption that students in T, D and C classes are randomly allocated. In particular, while the diff-in-diff design can account for differences in fixed characteristics, the key hypothesis is the absence of different trends for the treated and untreated students affecting their level of financial literacy.

We estimate the following model (1). The treatment dummies, D and T, are equal to 1 if a student i is in class j treated with D or T and 0 otherwise, and y_{ij} is our outcome of interest (inflation, interest and diversification). We will estimate the variation of the following model:

$$y_{ij}= \alpha + \beta_1 D_{ij} + \beta_2 P1_{ij} + \beta_3 P2_{ij} + \beta_4 D_{ij}P1_{ij} + \beta_5 D_{ij}P2_{ij} +$$

$$+\beta_6 T_{ij} + \beta_7 T_{ij}P1_{ij} + \beta_8 T_{ij}P2_{ij} + \beta_9 X_{ij} + \varepsilon_{ij} \qquad (1)$$

where the dummy variables P1 and P2 take value 0 before the treatment, 1 three weeks and three months after the treatment, respectively. β_4, β_5, β_7 and β_8 are the coefficients of interest, namely the interactions between each treatment dummy and the dummy period. They reveal whether the expected mean change in outcome from before to after was different in the two groups both three weeks and three months later. X is a vector of individual controls (age, sex, income and predetermined individual characteristics). We included clustered standard errors at the class level.

Table 4 - Diff-in-Diff Probit Estimation of Financial Literacy outcomes - Marginal Effects

VARIABLES	(1) Inflation	(2) Interest	(3) Diversification	(4) Rough Finlit
D Classes_After Three Weeks	0.287**	0.141***	0.068	0.245***
	(0.134)	(0.048)	(0.069)	(0.074)
D Classes_After Three Months	0.101	0.229***	-0.005	0.291
	(0.145)	(0.059)	(0.129)	(0.181)
T Classes_After Three Weeks	0.237***	0.424***	0.268***	0.324**
	(0.069)	(0.148)	(0.073)	(0.126)
T Classes_After Three Months	0.286***	0.410***	0.147**	0.246*
	(0.058)	(0.074)	(0.064)	(0.129)
D Classes	0.125**	0.002	0.079	-0.001
	(0.057)	(0.048)	(0.08)	(0.045)
T Classes	-0.056	-0.057	0.016	-0.005
	(0.058)	(0.087)	(0.028)	(0.073)
Control_G_After Three Weeks	0.058	-0.023	0.034	0.05
	(0.044)	(0.041)	(0.032)	(0.048)
Control_G_After Three Months	0.089**	-0.035	0.009	0.036
	(0.04)	(0.034)	(0.029)	(0.037)
Female	-0.157***	-0.119***	-0.082**	-0.125***
	(0.032)	(0.040)	(0.037)	(0.026)
Income	0.019	-0.019	-0.061*	-0.029
	(0.047)	(0.037)	(0.033)	(0.037)
Economics	0.018	0.101**	0.031	0.037
	(0.065)	(0.051)	(0.057)	(0.068)
Math Grade (Above 6)	0.129***	0.140***	0.109***	0.100***
	(0.045)	(0.043)	(0.033)	(0.037)
Other Control	YES	YES	YES	YES
Observations	1,188	1,192	1,187	1,062
Pseudo R2	0.081	0.061	0.05	0.073

Clustered standard errors at the class level in parentheses *** p<0.01, ** p<0.05, * p<0.1

Other Control weakly or not statistically significant: Age, Repetition, Only Child, Foreign, Foreign Parents, Distance from the City Centre, Father/ Mother Degree, Father/Mother Freelance.

For each question, the number of missing values is different.

The last column aggregates the questions, so the number of observations is different.

Table 4 indicates that both the traditional and the digitized course increased knowledge three weeks after the course (the traditional one each outcome, the digitized one 2 out of 3 outcomes). In particular, interest and inflation results are meaningful. In fact, there is a positive correlation between following one of the financial education programs proposed and correctly answering questions which require more mathematical skills compared to the control group. The average marginal effect for diversification outcome for students who attended the traditional course is 0.27 after three weeks, becoming lower but still statistically significant after three months (0.15).

However, considering our proxy for financial knowledge, *Rough Finlit*, the digital course shows a positive and statistically significant marginal effect only in the short-run (0.24 after three weeks). The traditional course on the other hand shows a more stable marginal effect both three weeks later (0.32) as well as three months later (0.25). Moreover, in line

with PISA results, there is a positive and significant correlation (0.10) between mathematicsal ability and overall financial knowledge. This kind of effect is also higher for outcomes strictly related to numerical ability, such as inflation (0.13) and interest calculation (0.14).
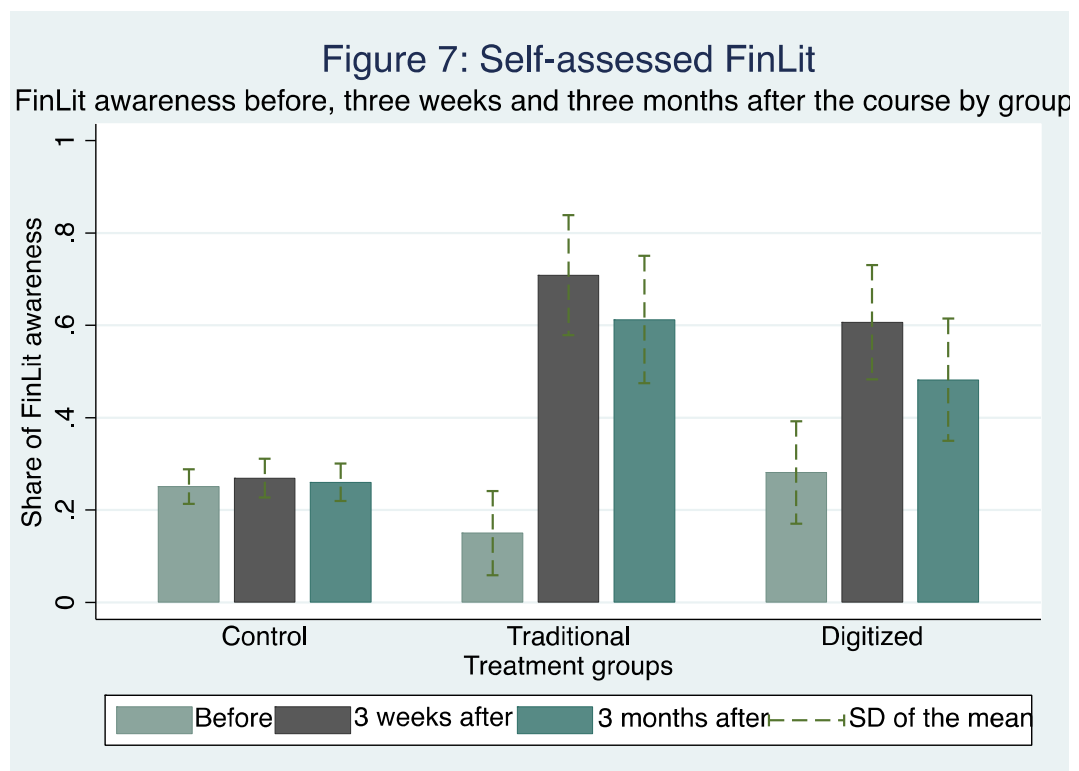
We also see a gender gap emerge. The marginal effect of being *female* on *Rough Finlit* is -0.12. This gap is higher for inflation knowledge (-0.16). Moreover, students who would like to study Economics at the University, show a positive and significant marginal effect (0.10) in correctly answering the interest question.

Thus following one of the two types of courses based on the same free available material published by the Museum of Savings, has positive effects of dissemination of financial education at negligible costs. In just 8 hours, attending the course increases the probability of responding correctly to the inflation question after three weeks. While both treatments are effective in the short-run, the positive effect of the traditional course effect is persistent significant in the long-run, as well. This being said, the traditional course does require a higher cost in comparison to the digitized one. Our findings suggest that the digitized course may be a good starting point from which to build new policies to improve financial literacy in the shortest possible time but the more expensive traditional course might be a more suitable alternative if the effects are to persist over a longer time frame.

In a variant of the model (1), we also split the sample and study the effects of the treatments conditional on several observable characteristics (for example sex, ability in math, and other personal characteristics) of the student. For instance, Appendix Tables A1 and A2 repeat the analysis of Table 4 investigating the existence of differential effects for females and math-skilled students, respectively. The main results here are: that female students who attended one of the two courses benefited most from attending the traditional one in terms of financial literacy learning in the long run. Further, students with high mathematical skills show increased knowledge of inflation (0.33 is the effect for the digital treated group in the short run) and interest calculation concepts (0.22 is the effect for the digital treated group in the long run).

# 5.   Real and Self-Assessed Financial Literacy

Several findings emerge from the descriptive analysis. Among them, an interesting aspect is a misalignment between self-assessed and real financial knowledge. In contrast with the adult population (Di Salvatore et al., 2018), millennials are not overconfident about their level of financial literacy. In fact, the first survey conducted before the course reveals that more than 75% of students interviewed (in a sample of 642 students who answered this question) assessed themselves as having a low financial literacy level, 23% claim that they know enough about financial concepts and only 1% of students consider themselves very financially literate. Those who followed one of the two courses showed an increased self-assessed financial literacy level. Moreover, in comparison to the digital course, the results suggest that the traditional course does not just increase financial knowledge but also increases the awareness of the real financial literacy level. To show this, we will create another dummy variable regarding self-assessed financial literacy. Its value will be 0 if students consider their level very low, and 1 if they claim to have a good or a very good level of financial literacy.

Figure 7: Self-assessed FinLit
FinLit awareness before, three weeks and three months after the course by group

Taking into account both previous results as well as results from the Fig. 7, we can conclude that following one of the two simplified financial education programs, there is an improvement and greater alignment of real and perceived financial literacy. In fact,

even if both real and perceived financial literacy are still higher in comparison to the period before the course, when real financial literacy decreases over the course of time then, so also does their perception of their own financial knowledge.

These results also show that perceived financial literacy is linked to real financial knowledge as a whole learning process and not only to the confindence in the single right answer. For this reason, the control group increased in the share of the right answers but not in the perceived level of their real financial knowledge. To go deeper, we report the results graphically below.

Figure 8: Self-assessed FinLit
FinLit awareness before and three weeks after the course by gender
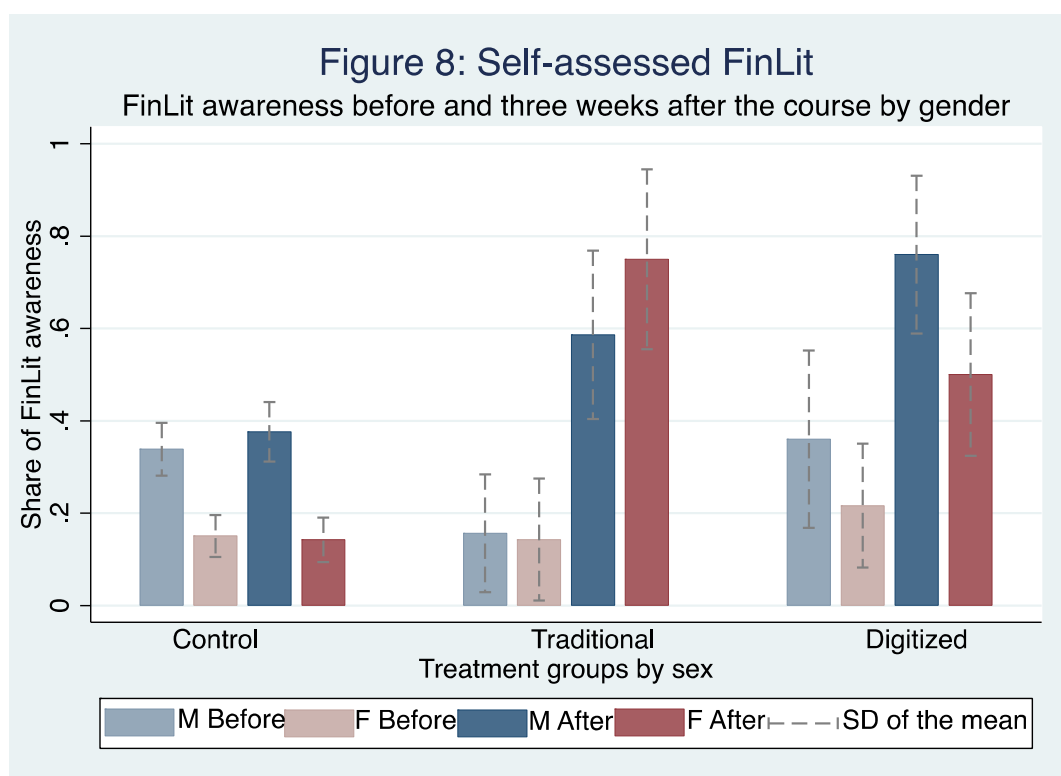
Thus regardless of the course the students attended, they were able to increase not only their knowledge but also the perception of their real knowledge in economics and finance. In fact, over 34% of the students of the digital course and 50% of students of the traditional course declared no longer declared a low level but rather a medium perceived level of financial literacy. The absence of a high perceived level of knowledge is in itself a good result. Following Brugiavini et al. (2018), we analyze whether self-assessed knowledge corresponds to real knowledge level before and after and if a gender effect is present. As Figure 8 shows, although the level of self-assessed financial literacy was the same both for male and female students of the traditionally treated group before the

course, it is higher for female students after the course. In the case of the digital treated group however, it was male students who showed a greater increase in the self-assessed level of finaical literacy compared compared to their female school-mates. Comparing the traditional and the digitized course, a gender effect emerges. We find that awareness increased exponentially for students who attended the course with the support of a financial advisor, in particular among females.

This particular design allows us to estimate a diff-in-diff model running a probit estimation on self-assessed financial knowledge. The self-assessed financial knowledge dummy takes the value 0 if students consider their financial knowledge level very low and the value 1 if they claim to have a good or a very good level of financial literacy. To disentangle the effects, we estimate model (1), with self-assessed financial knowledge as the dependent variable, first. Then, we repeat the analysis, including real financial knowledge (*Deep FinLit*) as an additional control variable. Finally, we add the interaction terms with *Deep FinLit* to the previous estimation.

Table 5 - Diff in Diff Probit Estimation of Self-Assesed Financial Literacy - Marginal Effects

VARIABLES	(1) Self-Assessed Financial Literacy	(2) Self-Assessed Financial Literacy	(3) Self-Assessed Financial Literacy
Deep Finlit_D Classes_After Three Weeks			-0.076
			(0.082)
Deep Finlit_D Classes_After Three Months			0.115*
			(0.06)
Deep Finlit_T Classes_After Three Weeks			0.091
			(0.112)
Deep Finlit_T Classes_After Three Months			0.129*
			(0.075)
Deep Finlit_D Classes			-0.082***
			(0.03)
Deep Finlit_T Classes			-0.148***
			(0.047)
Deep Finlit_After Three Months			-0.062**
			(0.028)
Deep Finlit		0.076***	0.109***
		(0.017)	(0.026)
D Classes_After Three Weeks	0.162	0.1	0.323
	(0.111)	(0.1)	(0.295)
D Classes_After Three Months	0.065	0.037	-0.191
	(0.077)	(0.073)	(0.172)
T Classes_After Three Weeks	0.457***	0.414***	0.264
	(0.058)	(0.053)	(0.241)
T Classes_After Three Months	0.463***	0.385***	0.172
	(0.059)	(0.069)	(0.251)
Control_After Three Weeks	0.025	0.015	0.018
	(0.033)	(0.031)	(0.094)
Control_After Three Months	0.003	0.001	0.123*
	(0.029)	(0.028)	(0.07)
D Classes	0.107	0.103	0.264***
	(0.07)	(0.064)	(0.103)
T Classes	-0.188	-0.179	0.101
	(0.123)	(0.12)	(0.117)
Female	-0.200***	-0.170***	-0.171***
	(0.04)	(0.038)	(0.039)
Income	0.044	0.05	0.052
	(0.033)	(0.033)	(0.032)
Economics	0.147**	0.137**	0.137**
	(0.057)	(0.055)	(0.054)
Math Grade (Above 6)	0.022	-0.006	-0.007
	(0.043)	(0.04)	(0.039)
Other Controls	YES	YES	YES
Observations	1,188	1,160	1,160
Pseudo R2	0.122	0.144	0.152

Clustered standard errors at the class level in parentheses *** p<0.01, ** p<0.05, * p<0.1

Other Control weakly or not statistically significant: Age, Repetition, Only Child, Foreign, Foreign Parents, Distance from the City Centre, Father/ Mother Degree, Father/Mother Freelance.

The main result in Table 5 is that self-assessed financial literacy level increased three weeks (0.45) and three months (0.46) after for students attended the traditional course, column (1). This result is robust to the inclusion of the variable for real financial knowledge *Deep FinLit*, column (2). Interacting real financial knowledge and treated groups before and after the course, we find that in line with the Socrate's Paradox, the data in column (3) reveals that for people who attended one of the two courses, self-

assessed financial knowledge is negatively correlated with financial knowledge before the courses. It is however to positively correlated three months after courses (0.115 and 0.126, which is weakly statistically significant). The interpretation here is tricky. The effect of Deep FinLit is smaller before they take the course. It seems they anticipate that since they are about to take a course in financial literacy, their level of knowledge on the topic is inadequate. The course itself does not make any relevant change. However, students with a higher level of financial literacy are more aware of their knowledge (0.08 and 0.11 in the full specification). The difference in age but also in course hours could explain the difference in our different results compared with Brugiavini et al. (2018).

We also see a positive and robust effect (0.14) that emerges between self-assessed financial literacy and the desire to choose an Economics University in the next future. However, female students are less confident than their male peers (-0.20 and -0.17 in the full specifications). This gap is an interesting in the context of overconfidence and investment choice. The fact that financially educated millennials are more aware of their financial knowledge supports the idea that they will make better financial decisions in their future. The lower confidence of female students is in line with the most recent literature on the financial gender gap (GFLEC, 2020). In our experiment, the difference in self-assessed financial literacy level becomes smaller after the course. If the treatment would be addressed mainly to female students, the existing gap could be alleviated or even eliminated.

Self-assessed knowledge is higher than real knowledge on average (0.26 and 0.10 before the courses for D and T Classes respectively, column 3). Following this type of financial education program improves both their knowledge and their awareness of their real financial literacy level. In particular, running an OLS regression on the difference between the categorical variables Self-Assessed Financial Literacy and Deep FinLit before, after and at the end of the course, for each group, we can conclude that the treatment significantly reduces the gap between real and self-assessed knowledge (-0.28 three weeks after, -0.46 three months later at 1%). This result is true especially for the traditional treatment. The interaction terms are negative for both courses after three months, in particular, -0.46 is the effect for the traditional one statistically significant at the 5% level.

6. Conclusion

Nowadays, the need to improve financial literacy is ubiquitous throughout the world. As the OCSE-PISA report states in its title (OECD, 2014), financial literacy is the necessary skill for the 21st century. Following the OECD-INFE guidelines, we set up a field experiment implementing a financial education program called "Futuro Sicuro: Sapere per sapersi difendere" on a sample of 650 high school students in Italy. So, the contribution is to identify alternatives ways to teach financial concepts, making the learning process more straightforward and funny at negligible costs. The school environment makes it possible to take advantage of the period during which people tend to be particularly receptive.

We randomly provide two treatments at the class level. One is a theoretical, rule-of-thumb-based financial education program with the presence of a financial advisor, and the other is a digitized financial education program using web-based applications based on the learn-by-playing rule. The study conducted on six classes suggests that both courses have some positive and statistically significant effects. More research is required before we can make conclusive statements about which financial education program is better to spread financial literacy. The two treatments were associated with different costs but showed similar effects. In particular, three weeks after their conclusion, we find that the probability that the treated groups correctly answer financial literacy questions increased by more than 20 percentage points compared to the control group. On top of that, results also aligned with participants' realistic assessments of their financial skills. A follow-up study reveals that only the traditional course seems to confirm the same statistical significance for two out of three outcomes in the long run.

It appears that the "Futuro Sicuro" setting causes significant improvements and can both simplify training and rely more on digital power. Findings indicate the opportunity to obtain higher results also with lower stress, also increasing self-assessed financial knowledge. Comparing costs between traditional and the digitized course, the last one outperforms the traditional course. However, even if the traditional course is much more expensive due to the presence of an expert in the classroom, such as a financial advisor, its effect seems to be more impressive in the minds of students in the long run in comparison to the effect of the digitized course. It is focusing on the control group, just filling out questionnaires more than twice could trigger a mechanism that excites their

curiosity about the theme. Still, no effect emerges on their self-assessed financial literacy. It could be a compelling public policy starting point.

Moreover, talking about daily problems with a good dose of expertise related to this field could increase their curiosity as well as their ability to face up good wealth management requirements. In line with OCSE-PISA reports, a gender gap emerges. Female students perform worse than male students. The gender gap could be due to non-cognitive skills and a declared higher comfort of males with technology.

However, several are the next steps to do before reaching a final position about them. First of all, behavioral aspects must be an object of analysis to understand if the courses could change them after their attendance. Finally, we can spread the courses wider to increase financial literacy among millennials. The replication of the study in other areas could help to detect the presence of specific regional patterns.

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APPENDIX

Table 1A - Diff-in-Diff Probit Estimation of Financial Literacy outcomes - Marginal Effects (Female)

VARIABLES	(1) Inflation	(2) Interest	(3) Diversification	(4) Rough Finlit
Female_D Classes_After Three Weeks	0.271*	0.138*	0.129	0.206**
	(0.148)	(0.072)	(0.143)	(0.092)
Female_D Classes_After Three Months	0.142	0.152	-0.016	0.291
	(0.124)	(0.095)	(0.171)	(0.201)
Female_T Classes_After Three Weeks	0.158	0.397*	0.361***	0.22
	(0.130)	(0.232)	(0.103)	(0.161)
Female_T Classes_After Three Months	0.385***	0.382***	0.482***	0.222***
	(0.109)	(0.103)	(0.120)	(0.077)
Female_D Classes	0.129	-0.013	0.09	-0.008
	(0.083)	(0.103)	(0.075)	(0.075)
Female_T Classes	-0.077	-0.036	-0.146**	-0.017
	(0.064)	(0.108)	(0.060)	(0.097)
Female_Control G_After Three Weeks	0.112	-0.022	-0.047	0.120*
	(0.073)	(0.064)	(0.055)	(0.062)
Female_Control G_After Three Months	0.083	-0.072	-0.004	0.093*
	(0.052)	(0.055)	(0.049)	(0.055)
Female_Control G	-0.247***	-0.105**	-0.081*	-0.205***
	(0.046)	(0.053)	(0.047)	(0.041)
Income	0.016	-0.027	-0.064*	-0.031
	(0.047)	(0.036)	(0.034)	(0.036)
Economics	0.021	0.109**	0.036	0.044
	(0.063)	(0.052)	(0.054)	(0.067)
Math Grade (Above 6)	0.135***	0.147***	0.112***	0.105***
	(0.044)	(0.042)	(0.032)	(0.037)
Other Control	YES	YES	YES	YES
Observations	1,189	1,192	1,187	1,062
Pseudo R2	0.076	0.049	0.051	0.064

Clustered standard errors at the class level in parentheses *** p<0.01, ** p<0.05, * p<0.1
Other Control weakly or not statistically significant: Age, Repetition, Only Child, Foreign, Foreign Parents, Distance from the City Centre, Father/ Mother Degree, Father/Mother Freelance.

The table A1 reporting diff-in-diff probit estimation for female treated students reveals that both courses improve financial outcomes. The average marginal effect of attending the digitized course on female Rough FinLit (0.21) is statistically significant but only in the short run. However, the average marginal effect of traditional course is highly statistically significant just three months after the course for female students (0.22).

However, table 2A, shows in columns (1) and (2) that among students with high ability in math attending one of the two courses, the marginal effect is higher for numeracy outcomes such as inflation and interest calculation. Moreover, in column (4), they show a
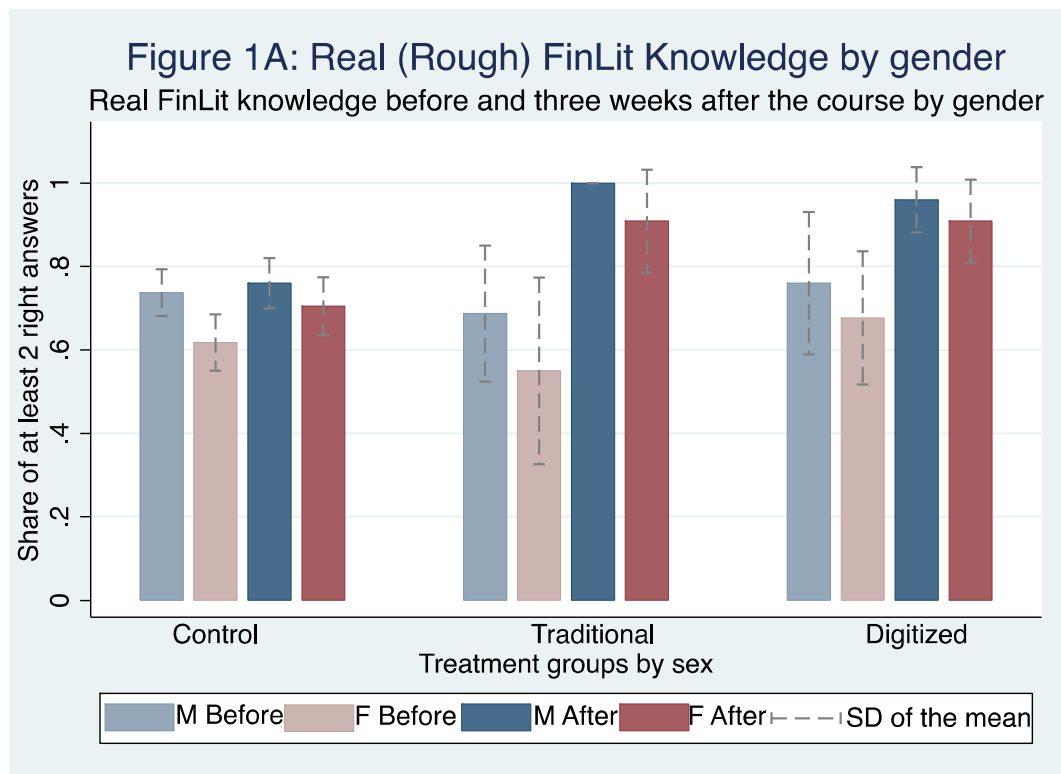
high and positive statistically significant average marginal effect on the overall financial knowledge just for the traditional course in the short run (0.30).

Table 2A - Diff-in-Diff Probit Estimation of Financial Literacy outcomes - Marginal Effects (Math Skills)				
	(1)	(2)	(3)	(4)
VARIABLES	Inflation	Interest	Diversification	Rough Finlit
Math_D Classes_After Three Weeks	0.115	-0.007	-0.226	-1.415
	(0.234)	(0.209)	(0.206)	(71.502)
Math_D Classes_After Three Months	-0.377	-0.028	-0.426**	-1.39
	(0.254)	(0.218)	(0.207)	(73.688)
Math_T Classes_After Three Weeks	-0.174	-0.034	-0.199	-0.033
	(0.246)	(0.274)	(0.262)	(0.266)
Math_T Classes_After Three Months	-0.45	-1.292	-1.462	-1.42
	(0.278)	(35.463)	(33.768)	(96.273)
Math_D Classes	-0.175	-0.131	0.197	-0.072
	(0.148)	(0.142)	(0.139)	(0.133)
Math_T Classes	0.153	-0.184	0.15	-0.01
	(0.166)	(0.147)	(0.139)	(0.144)
Math_Control G	0.171***	0.157***	0.104**	0.115**
	(0.05)	(0.048)	(0.044)	(0.046)
D Classes_After Three Weeks	0.213	0.14	0.182	1.549
	(0.179)	(0.160)	(0.149)	(71.502)
D Classes_After Three Months	0.387*	0.244	0.25	1.564
	(0.216)	(0.170)	(0.160)	(73.688)
T Classes_After Three Weeks	0.360*	0.434*	0.380*	0.338*
	(0.201)	(0.222)	(0.198)	(0.205)
T Classes_After Three Months	0.621***	1.657	1.472	1.573
	(0.240)	(35.463)	(33.768)	(96.272)
Control G_Three Weeks After	0.073	-0.05	0.014	0.032
	(0.055)	(0.051)	(0.047)	(0.051)
Control G_Three Months After	0.108**	-0.03	0.019	0.031
	(0.054)	(0.05)	(0.046)	(0.05)
D Classes	0.230**	0.08	-0.021	0.044
	(0.116)	(0.11)	(0.097)	(0.104)
T Classes	-0.168	0.062	-0.072	0.001
	(0.139)	(0.118)	(0.105)	(0.117)
Female	-0.156***	-0.120***	-0.083***	-0.126***
	(0.027)	(0.027)	(0.025)	(0.026)
Income	0.022	-0.021	-0.060**	-0.028
	(0.03)	(0.029)	(0.027)	(0.029)
Economics	0.024	0.110**	0.033	0.048
	(0.044)	(0.044)	(0.04)	(0.043)
Other Control	YES	YES	YES	YES
Observations	1,189	1,192	1,187	1,062
Pseudo R2	0.090	0.068	0.059	0.086

Clustered standard errors at the class level in parentheses *** p<0.01, ** p<0.05, * p<0.1
Other Control weakly or not statistically significant: Age, Repetition, Only Child, Foreign, Foreign Parents, Distance from the City Centre, Father/ Mother Degree, Father/Mother Freelance.

Figure 1A: Real (Rough) FinLit Knowledge by gender

Real FinLit knowledge before and three weeks after the course by gender

In addition, testing the differences between Rough FinLit three weeks and three months after, the knowledge acquired through a traditional simplified course is not only more persistent in comparison to the digitized treatment, but these results are also independent of the incentives given to the students for the second survey (after three weeks from the end of the course). However, if we consider a cost-benefit analysis, it could be possible to opt for the digitized one since students can watch at the video whenever they want to fix better the concept or to refresh their memory, at the only cost of internet Wi-fi connection.

Table 3A - Rough Financial Literacy before and three weeks after the course by groups

	Male		Female		Difference	
	% pre	% post	% pre	% post	% pre	% post
Total Sample	0.66	0.74	0.51	0.66	0.15***	0.08**
	[329]	[266]	[306]	[254]	(0.038)	(0.039)
Control Group	0.65	0.69	0.49	0.59	0.16***	0.10**
	[264]	[217]	[230]	[198]	(0.044)	(0.044)
D Classes	0.69	0.96	0.44	0.88	0.25**	0.08
	[26]	[25]	[36]	[34]	(0.12)	(0.10)
T Classes	0.66	1	0.43	0.91	0.23*	0.09
	[33]	[24]	[28]	[22]	(0.14)	(0.06)

Note: In square brackets we report the number of observations. The "Diff" columns report the mean differences between groups with robust standard error in parentheses.
***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

The real-financial-literacy gap between males and females treated in both courses reveals different results (Table 3A). For the traditional one, it is statistically significant before, but the difference is filled with attending the course. Instead, the gender gap becomes weakly statistically significant after students attended the digitized course. A gender gap in the total sample as well as in the control group emerged before the course and it is persistent, even if reduced, also after the course.

To wrap up, considering a diff-in-diff analysis in financial knowledge between each group, the main message is that there is no statistically significant difference between the increment both of real financial literacy and self-assessed financial literacy between traditional and digitized treated. In contrast, for both of them, their difference between students who follow a financial literacy program in comparison with those who do not attend anyone is higher and highly statistically significant. In particular, the traditional course increased on average real financial literacy level by more than 28 percentage points. A diff-in-diff analysis reveals that the average marginal effect is 0.32 in the short run and 0.24 in the long run. Moreover, the increment in self-assessed knowledge is in line with the real level. Finally, their financial awareness and real financial literacy level are aligned among each group. The probability of becoming more aware among those who have a high level of financial knowledge increased in each group of treated in comparison with the control group (it increased more in the traditional one even if their difference is not statistically significant). Their differences from the control group are

positive and highly statistically significant. At the same time, following a financial education program decreases the probability of students who self-assessed a low level of financial literacy in comparison with the control group.