The evaluation of Formative Tutoring at the University of Padova*

La valutazione del tutorato formativo all'Università di Padova

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Abstract The Programme of Formative Tutoring, an integrated tutoring model to contrast drop-out and empower university students, has been experimented in Academic Year 2016-2017 in eight First Cycle Degree Courses at the University of Padova. A propensity score matching procedure has been used to build a suitable control group to evaluate the effectiveness of the tutoring. The data used to match students comes from university administrative archives and from the questionnaire submitted to all freshmen. Results show that students that attended the tutoring activities during their first year of university performed better in term of university outcomes and number of credits achieved. Results are slightly different according to the area (scientific or humanities) of the Degree Course.

Abstract *Il Programma di Tutorato Formativo, un modello di tutorato integrato per contrastare il drop-out e favorire l'empowerment gli studenti universitari, è stato sperimentato nell'Anno Accademico 2016-2017 in otto corsi di laurea triennale dell'Università di Padova. Per valutare l'efficacia del tutorato è stato costruito un appropriato gruppo di controllo utilizzando il propensity score matching. I dati utilizzati per abbinare gli studenti provengono da archivi amministrativi universitari e dal questionario compilato da tutte le matricole. I risultati mostrano che gli studenti che hanno frequentato le attività di tutorato durante il loro primo anno di università hanno conseguito risultati migliori in termini di esiti universitari e numero di crediti raggiunti. I risultati sono leggermente diversi a seconda dell'area (scientifica o umanistica) del corso.*

Key words: effectiveness, university outcomes, propensity score matching

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1 The Formative Tutoring

The Programme of Formative Tutoring (Da Re et al. 2017), an integrated tutoring model to contrast drop-out and empower university students, has been extensively experimented in Academic Year 2016-2017 in eight First Cycle Degree Courses at the University of Padova. The considered Degree Courses belong to two macro scientific-didactic areas: Scientific and Humanities.

The Formative Tutoring (FT) has been offered to all first year students of the eight Degree Courses, about 1770 students (1135 in the Scientific area and 635 in the Humanities area). The program has been promoted in different forms to all students: flyers and posters were distributed in places frequented by the students during the period of completion of the enrolment procedures, e-mail was sent to all the enrolled students, presentation has been made during the days of welcome to the freshmen and during the lectures of the first semester.

The Program has foreseen some training and informative meetings divided in:

• Service tutoring: the University Student Services have met the students orienting them to the use of their resources and proposals;

• Tutoring and Peer tutoring: the students, divided into small groups, worked on transversal skills (the method and the study skills, the participation in university life, the knowledge of the academic context, the reflection about their academic and professional expectations, the ability to evaluate and self evaluate, the development of problem solving strategies, the ability to work in a group, the ability to make informed choices, etc.), with the support and coordination of a professor of the Degree Course (Academic Tutor) or of a student in the years following the first (Student Tutor). The total number of meetings for Degree Course ranged from a minimum of 10 to a maximum of 16 meetings.

The implementation of the activities of the FT, designed and prepared with the active collaboration of the Student Tutors, depends on the different scientific didactic contexts, the internal organization of each Degree Courses and its specific needs.

2 Participation to the Formative tutoring

Formative tutoring was offered to all 1770 freshman, but the actual participation was on a voluntary basis. About 42% of the students (750 students out of 1770) have been involved at least for one meeting in the FT. The students who have attended it regularly (at least one third of the activities) have been 218, around 12%, with some differences between the two macro scientific-didactic areas. From now on, we will call these students "the participants".

Administrative data and data from a questionnaire given to all students at the moment of enrolment, can shed some light on the characteristics of the participants. A logistic regression model has been estimate to study the variables that affect participation to the FT (see Table 1).

The first result is that characteristics of the students that affect participation are different for the two macro areas, indicating different profiles of participants. Regarding the Scientific macro area, participants are characterized by having obtained higher marks at the final high school exam and have used more information sources to choose the degree course. Also practical aspects matters: students temporarily transferred in Padova have a greater propensity to participate regularly with respects to commuters. Also for the Humanities macro area a high mark at the final exam of high school increases participation, but differently from the Scientific macro area coming from a Technical Institute has a negative effect on participation. The most important factor affecting participation is the declared intention of the students to dedicate time to the study and to attend the lessons.

Table 1: *Logistic regression to model the participation to the Formative tutoring vs. non participation*

Variables	Scientific macro area	Humanities macro area
Secondary school final score	0.028***	0.04**
Enrolment after leaving secondary school (ref: Not immediately after)		
Immediately after	0.461	0.378
Secondary school (ref: High school)		
Polytechnic		-0.656**
Vocational school		-0.168
Degree course (ref: Sciences)		
Engineering	0.133	
Place of residence (ref: Live-in students)		
Commuting students	-0.731***	
Resident students	-0.924**	
Number of sources used to get information to choose the Degree Course	0.410***	
Friends as source of information to choose the Degree Course	-0.928***	
Declared intentions of attendance and commitment in the first year (ref: maxima)		
Substantial attendance and commitment		-0.823**
Low attendance but substantial commitment		-2.71***
Low attendance and commitment		-2.379***
Minimum attendance and commitment		-1.749***

*** $p<0.01$; ** $p<0.05$

In general, for both areas, there is no effect on the probability to participate of variables regarding the socio-cultural characteristics of the students' family of origin and variable related to the intentions to work during the Degree Course.

3 Evaluation of the Formative tutoring

To evaluate the effectiveness of the FT we would like to compare university outcomes of participants and non participants to the FT. But since in the previous section we have seen that participants and non participants are different in term of observed characteristics, the differences in outcomes, if any, could be attributed not to the FT but to the differences between the two groups of students. Considering the FT as a treatment (Rubin 1974, Martini and Sisti, 2009) we need to find a group of non treated students, the non-participants, comparable to the treated, the participants.

3.1   *Method and results*

To a build a comparable comparison group we use a matching procedure. The rationale is that each treated unit will be matched to a comparison with the same observed characteristics. In this way differences between the groups of treated and non treated with regards to university outcomes, could be attributed only to the treatment (the FT). To apply matching the underlining assumption is that all the reasons why people participate to FT are known and observed via the variables considered, in other word it's satisfied the independence of individual characteristics with respect to the presence or absence of treatment. Given that the variables considered (listed below) range from socio-economic characteristics to variables related to study motivation, we may think the unobservable part of the selection process has a negligible effect. The assumption that could be debatable is the existence of a single version of the treatment since each Degree Course organise the FT according to their needs (see section 1). Nevertheless we can considerer the FT as a whole, since the set of intervention are designed and performed with the same goals and only slightly adapted to the single context.

As regard the application of the methodology, given the high number of variable affecting the participation to the FT an exact matching in not feasible. A propensity score matching is then performed (Rosembaum and Rubin, 1983, Thoemmes and Kim 2011). The propensity score, the probability to participate to the FT conditional to a number of observed variables, has been estimated on participant and non participant with a logistic regression. The data used to match students comes from university administrative archives and from the questionnaire submitted to all freshmen. In particular, the variables used for estimating the propensity score are: gender, age, type of high school and final grade, enrolment immediately after graduation or not, score obtained in the university admission test, Degree Course, cultural and professional level of the family of origin, working status, commuting, motivation for university choice.

A nearest neighbour propensity score matching on participants and non-participants, separately for the two macro areas, has been performed. The analysis of the histograms of the estimated propensity score for participant and non participant shown a quite good common support.

The outcome variables are the distribution of university outcomes (drop-out, course change, regular students and delay) and the number of credits attained at the end of the first year. The results are shown in Tables 2 and 3.

Table 2: *Scientific macro area: university outcome on matched participants and non-participants*

Outcome	Non-participants	Participants
Drop-out	19.2	7.4
Change of Degree Course	14.9	4.3
Regular Student	55.3	74.5
Delay in the study	10.6	13.8
Number of credits	30.4[*]	40.7[*]

[*] Difference between the two groups significantly different from zero

Table 3: *Humanities macro area: university outcome on matched participants and non-participants*

Outcome	Non-participants	Participants
Drop-out	17.8	8.9
Change of Degree Course	5.4	3.6
Regular Student	67.9	87.5
Delay in the study	8.9	0.0
Number of credits	38.6[*]	60.2[*]

[*] Difference between the two groups significantly different from zero

Results show that students that attended the tutoring activities during their first year of university performed better in term of university outcomes and number of credits achieved. Results are slightly different according to the macro area (Scientific or Humanities) of the Degree Course.

For the Scientific macro area one the most relevant effect is on the outcomes: the participants have much lower rates of drop-out and change of Degree Course and a higher percentage of regularity of the studies (74.5% vs 55.3). The effect on the number of credits is present but in comparison with the other macro area it is lower (+10.3 credits). For the Humanities macro area the most relevant effect is on performance: the participants achieved a significant higher number of credits (+21.6). The differences in outcomes between participants and non- participants are, compared to the Scientific macro area lower, although still of interest.

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