IRPET Istituto Regionale Programmazione Economica della Toscana

XXIX National Conference of Labour Economics

The effects of a dropout prevention program on secondary students' outcomes

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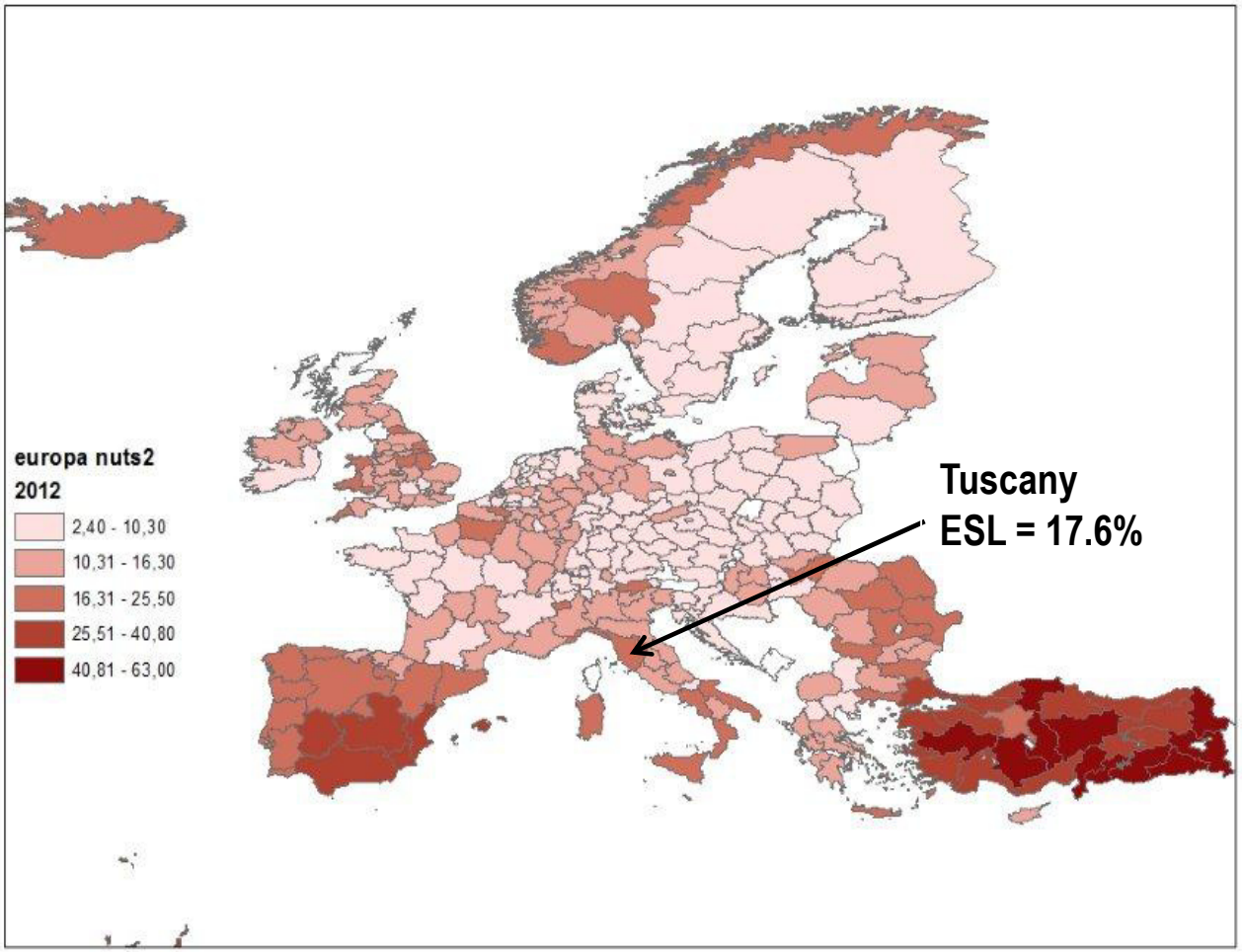
The effects of a dropout prevention program on secondary students' outcomes

- **Objective**. To evaluate the effectiveness of INNOVARE, a teacher-based dropout prevention program, promoted by the Tuscan Regional government (Italy).
- **Evaluation design.** Qualitative and quantitative approach.
- **Data sources.** Administrative sources from schools and a questionnaire on personal and family characteristics of students.
- **Main feature**. A cluster-level analysis and an individual-level analysis were performed for the quantitative evaluation.
- **Basic outputs.** Slight decrease in the probability to fail, to drop-out and in the absence rate; increase in the probability of postponement of the evaluation.

The problem of Early School Leaving

Early school leaving rates in Europe. 2012



Italy and Tuscany show particularly high and persistent early school leaving rates

The INNOVARE Program

When? In school year 2013/2014**.**

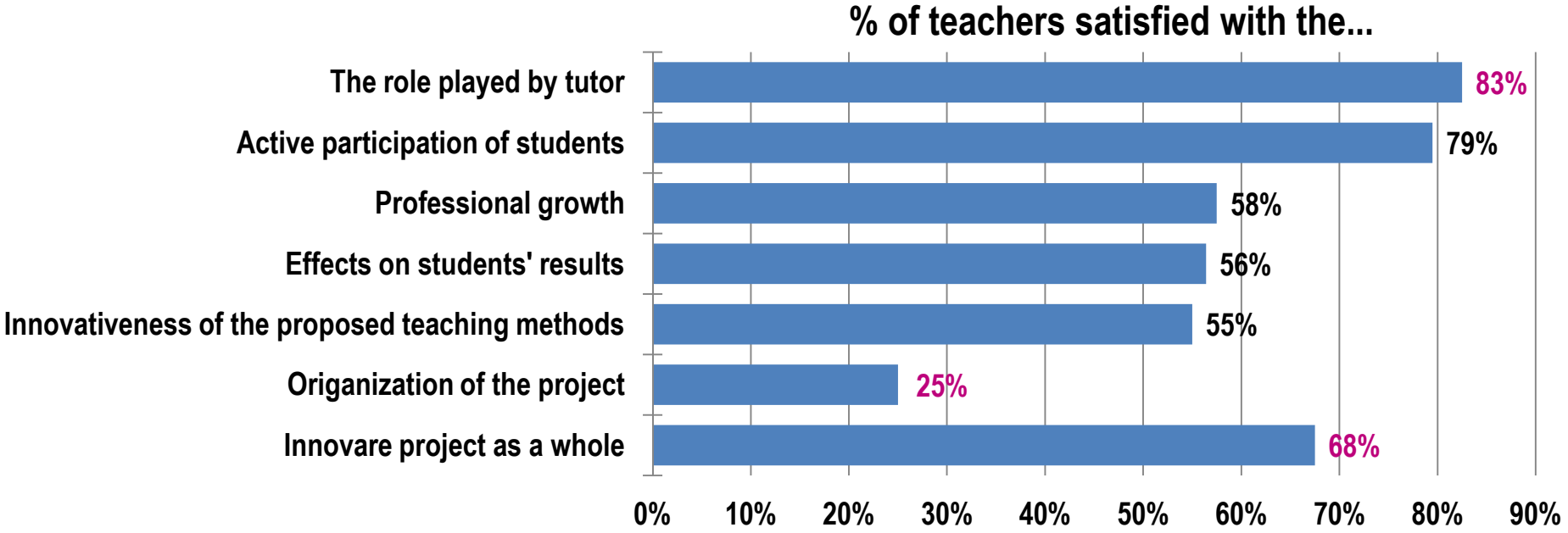
Where? The project involves 18 first classes in 12 Tuscan public secondary vocational schools.

What? An innovative teaching method inspired to the social research method called **"Action Research"** (Kemmis & McTaggart, 1982), characterized by an extensive use of **educational workshops and by learning by doing**, in a process of continuous comparison - reflection - correction of the educational practices implemented.

How? The program is **teacher-based:** it acts on teachers in order to have an effect on students. It consists of **10 meetings between the expert-tutors and the teach**ers involved in the project, which then lead to the application of the new proposed teaching to their students during the second term of school year. The subjects considered by the experiment are: **Italian, Mathematics, Foreign language, Integrated science, Physics and technology.**

Qualitative approach: Focus Groups and questionnaires

- The Focus revealed a **general satisfaction with the project Innovare**, practically unanimous among the tutors, less pronounced but still a majority even among teachers.
- Particularly, teachers stressed the **effect of re-motivation**, which receives the highest level of satisfaction expressed by teachers answering to a short questionnaire.
- However, both teachers and tutors highlighted the **highly problematic context** in which the Innovare program was implemented.



Quantitative approach

- The INNOVARE study is a **cluster-randomized trial** where the unit of assignment is the class: within the 12 schools involved in the program, 18 classes were **randomly assigned to the treatment** of the new method and 35 classes were assigned to the control group.

- We conduct both:
  1. cluster-level analysis → randomization inference
  2. individual-level analysis →multilevel regression

- We tested the following **outcomes**:
  1. Drop-out
  2. Failure
  3. Postponements of the evaluation
  4. Absence rate (%)
  5. Failure or drop-out (1 + 2)

Observed Variables

Individual Background Variables	Class Variables	Outcome Variables (at the individual or class level)
Sex	Class size at the beginning of the school year	Failure
Year of birth	Class size at the beginning of the second semester	Postponement of the evaluation
Nationality	New entrants in the second semester	Drop-out
Late/not late	% drop-outs in the first semester	Absence rate (%)
Level of motivation (high, low)	% absence rate in the first semester	
% absence rate in the first semester	Average conduct mark in the first semester	
Average mark in the first semester	Average mark in the first semester	
Parents' education level (primary education or higher)	% foreigners	
Parents' occupational status (employed, unemployed)	% males	
	% late students	
	% repeating students	
	% students with parents with a low education level	
	% students with unemployed parents	
	% low motivated students	
	Teachers with a open-ended contract	
	Teachers between 30 and 50 years old	

Cluster level analysis (1)

- **Units of analysis**: classes

- **Variables entering the analysis**: cluster-level variables.

- **Methodology**: since classes are randomly assigned to treatment, we can use a randomization-based mode of inference.

Cluster level analysis (2)

This methodology assumes that a **randomized experiment** has been conducted and thus that the two subsamples (treated and controls) have **similar characteristics**.

Class variables	***Mean***	
	Control group	*Treatment group*
Percentage of foreign students	27.157	27.923
Percentage of male students	72.693	81.619
Percentage of delayed students	53.705	57.924
Percentage of students whose parents are low-educated	42.769	49.062
Percentage of students whose parents are unemployed	27.560	32.975
Percentage of low-motivated students	18.645	21.086
Teachers' position (tenured teacher versus fixed-term teacher)	0.857	0.889
Teachers' age (under 50 versus over 50)	0.857	0.722

Cluster level analysis (3)

- In order to account for differences in background variables between the treatment group and the control group we divide classes into **4 strata**, using the **propensity score**, estimated with a logistic regression model.

- Innovare is then evaluated as a **stratified cluster randomized experiment**, which implies that **within cells** defined by the propensity score the **treatment is randomly assigned**.

Stratum	*Propensity score stratum*	*Control Classes*	*Treated Classes*	*Total Classes*
1	0.00 – 0.20	14	2	16
2	0.20 – 0.40	8	5	13
3	0.40 – 0.51	7	2	9
4	0.51 – 1.00	2	8	10

Cluster level analysis (4)

- Focus on the **null hypothesis of no effect of treatment for any class**.

- The randomization distribution of test statistics is obtained by **changing the allocation of treatment** within the strata to obtain all the possible combinations of treated and controls (totally 250,192,800).

- For all possible allocations, the value of the statistic (the difference in average outcome between treated and controls) was calculated, thus obtaining its **randomization distribution.**

- From this distribution we calculated the probability of observing a value of the test statistic that is **extreme** in either tail of the distribution than the observed one.

P-value for the null hypothesis of no effect of treatment for any classes

Cluster level analysis (5)

Observed values of the test statistics and p-values for H_0: $Y_k(0) = Y_k(1)$

Outcome Variables	*Average difference in outcome*	*p-value*
Percentage of failures	-2.78	0.6040
Percentage of postponements of the evaluation	5.87	0.3034
Percentage of drop-outs	-2.41	0.6488
Absence rate (%)	-0.15	0.9298
Percentage of failures +Drop-out	-5.19	0.3484

Individual level analysis (1)

- **Units of analysis**: students.

- **Variables entering the analysis**: individual-level and cluster-level characteristics (including group-averages of the first level variables).

- **Methodology**: we use a multilevel model, which properly accounts for dependencies of outcomes of students in the same class.

Individual level analysis (2)

Outcome variable	Treatment	$E[Y_{ki}(0)]$	$E[Y_{ki}(1)]$	$E[Y_{ki}(1)]-E[Y_{ki}(0)]$
Failures	-0.258 (0.120)	0.157	0.105	-0.052
Postponement of the evaluation	0.245 (0.098)	0.253	0.337	0.084
Drop-out	-0.047 (0.183)	0.015	0.014	-0.002
Absence rate (%)	-1.024 (0.883)	14.835	13.810	-1.024
Failure + Drop-out	-0.217 (0.136)	0.223	0.164	-0.059

Conclusions

- **Two types of quantitative analysis** were carried out to assess the impact of the project INNOVARE on drop-out: a cluster-level analysis and an individual-level analysis using the potential outcome approach to causal inference.

- Both methods show a **slight decrease in the probability to fail, to drop-out, and in the absence rate**, and conversely an **increase in the probability of postponement of the evaluation**, linked to participation in INNOVARE.

- These effects, however, appear to be **quantitatively modest and statistically do not reach significance**; using the multilevel regression model weak statistical significance is found for some outcome variables.

- These **results are promising** when considered together with those emerged from the Focus Group analysis: notwithstanding organizational problems, the program managed to **re-motivate teachers**.

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