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INTRODUCTION

The Seminar "INVALSI data: a tool for teaching and scientific research", now at its sixth edition, has become in recent years an opportunity for meeting and discussion on the use of National Surveys INVALSI results and, in general, on the world of evaluation and school. Evaluation does not only mean standardized monitoring of learning levels, but also evaluation and comparison of its functions and potential in relation to the practices and tools through which the school system is able to carry out its educational and formative mission. This year, keynotes of national and international experts were organized on issues related to the evaluation of the education system and the use of data to support school policies.

One of the objectives of the seminar was to bring the world of scientific research and schools closer together in order to build a privileged and concrete space in which enriching the debate by sharing ideas and experiences between education and research stakeholders. The variety of topics improve a multidisciplinary approach to evaluation in the educational and school field, trying to give an account of the contribution that schools can provide to society by making possible the development of knowledge and skills.

The Seminar is organised by the research group of Area 2 - Statistical Service: Patrizia Falzetti (Manager), Paolo Barabanti, Andrea Bendinelli, Leonardo Boulay, Christian Carlucci, Emiliano Campodifiori, Michele Cardone, Federica Collia, Doriana delli Carri, Paola Giangiacomo, Patrizia Giannantoni, Jana Kopecna, Fabrizio Lasorsa, Giuseppina Le Rose, Francesca Leggi, Lorenzo Maraviglia, Michele Marsili, Monica Papini, Veronica Pastori, Antonio Severoni, Valeria F. Tortora.

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ABSTRACT

THEME 4. FINANCIAL LITERACY AND HUMAN CAPITAL - SKILLS FOR ECONOMIC CITIZENSHIP

ORGANIZER: INVALSI - BANK OF ITALY
COORDINATOR: DANIELA MARCONI
OCTOBER 27TH: 2.00 P.M. – 4.00 P.M. {ROOM 1 ANNAMARIA– RESEARCH 1}

The effectiveness of the Financial Education in Schools project of the Bank of Italy: preliminary evidence

Alessio D'Ignazio - Tommaso Agasisti - Angela Romagnoli - Gabriele Iannotta

It is now clear that financial literacy plays a crucial role not only in the workplace but also and above all in personal life decisions, such as how to choose a mortgage or manage their own savings. An ever-increasing literature, comprising both experimental (De Beckker et al. 2021, Batty et al. 2020, Modestino et al. 2019) and review studies (D'Alessio et al. 2020, OECD PISA 2018), is dealing with enhancing its importance and defining the more adequate instruments to promote it and evaluate it. Analyzing what has been done so far, two fundamental aspects emerge: the first one is that financial knowledge, attitudes and behaviors turn out to be critical in many countries, in particular in Italy; the second one is that programs and courses currently implemented often had great responses, especially in the learning of personal finance topics from students. In this regard, for over a decade, the Bank of Italy, in collaboration with the Ministry of Education, has been promoting the project "Financial Education in Schools", aimed at primary and lower secondary school students. The project offers training courses, organized by the staff of the Bank of Italy, dedicated to teachers; subsequently, the teachers discuss economic and financial issues in the classroom with their students. In the last two years, the project has been profoundly innovated through the creation of new educational resources to support the initiative. Following this renewal, the Bank of Italy, in collaboration with the Milan Polytechnic and with the contribution of the National evaluation committee for education (INVALSI), has launched an evaluation of the initiative's effectiveness. Objective of the work and empirical strategy: The work aims to evaluate the effectiveness of the project, with reference to primary and lower secondary school. To this end, it follows an experimental methodology. In particular, firstly a sample of participating classes was selected: for primary school, fifth grade classes, and third grade classes for lower secondary school. Subsequently, these classes were randomly assigned to three groups: the first group was assigned to training on basic economic-financial issues (so-called "treatment", group A); the second group was assigned to home study only ("alternative treatment", group B); the third group of classes were assigned to the "control" group (C). The use of an experimental methodology required careful planning of the work and a long data collection activity. Before the start of the actual experiment, a pilot intervention has been set up. A comprehensive institute, amongst a sample of 10 provided by the INVALSI, has voluntarily joined the proposal of participation, and two primary school teachers and two middle school teachers were contacted to illustrate the configuration of the project. Once defined the procedure, classes have been split in group A and group C, so as to have a direct comparison between treatment and control for both levels of education. The aim was to consolidate the design of the intervention, testing both the adequacy of the teaching material and the drafting of the questionnaires (later commented in detail). After receiving the feedbacks through two online follow-ups and making changes where criticalities emerged, the first phase begun. INVALSI randomly selected about 30 Comprehensive institutes; subsequently INVALSI contacted the school managers of the institutions involved, to inform them of the evaluation study and to invite them to join. Of the approximately 30 comprehensive institutes contacted, despite the difficulties associated with the pandemic emergency and the consequent teaching difficulties, 19 of them accepted to participate: 11 Comprehensive institutes in the Center-North and 8 in the South. Overall, about 1000 primary school and 1100 lower secondary school students participate to the experiment. After obtaining the adhesion of the Comprehensive institutes, the teachers involved were invited by the researchers involved in the project to participate to an online training meeting, during which the operational methods of the experiment were illustrated, with particular attention to the role of teachers in different groups A, B,

and C. In addition, the main characteristics of the Financial Education in Schools project and its main didactic objectives were explained during the meeting. At the end of this preliminary preparation phase, the actual test phase started, which included two distinct steps: (1) the measurement of the initial financial literacy of the students of the three groups by means of a short questionnaire, administered before the training of group A; (2) a final test, also carried out through the administration of a questionnaire to the students of the three groups, to be carried out after the completion of the training activity of group A and the self-training of the group B. The credibility of the results of a randomized controlled experiment is associated with the goodness of the random assignment mechanism of the students between the three different groups (A, B and C). In some cases, schools were allowed to reallocate classes between the different treatments assigned to them, thus modifying the initial random assignment. In large part this was necessary due to needs expressed by the teachers of the initially selected group A (to whom classroom training is attributed). This reallocation could produce an overestimation of the effectiveness of the Project to the extent that the teachers who self-select to carry out the training in the classroom are more motivated or prepared on financial education issues than those initially selected. It has been decided, however, to accommodate these requests from schools, also in order not to burden them too much, in a context of general difficulty of the teaching activity due to the pandemic. In addition, the evaluation analysis will be able to take into account several characteristics of the teachers, including interest in the subject and financial knowledge - measured through an ad hoc questionnaire - thus limiting the potential distortion associated with the reallocation of classes. Data: The first phase of the experimentation ended in the spring of 2022 with the conclusion of the final tests by all the students involved. About 1000 student questionnaires were collected for primary school and 1100 for secondary school; moreover, the empirical analysis will draw from about 120 questionnaires filled in by the teachers involved in the experimentation. Alongside the information drawn from the questionnaires, the evaluation study will also use two other data sources, on both students and teachers. The former consists of a series of information, available from INVALSI, relating to the student himself (for example, the scores relating to the tests of Italian, Mathematics and English conducted in the school year 2021/22) and to some factors of external context. Information relating to teachers is collected instead on a voluntary basis, through two anonymous questionnaires submitted to teachers in the initial phase of the experimentation and at the end of it. Information relating to students and teachers has a dual significance. On the one hand, they will allow for a more precise estimate of the impact of the project; on the other hand, they will allow us to assess whether the effectiveness of the project differs depending on the variation of some observable characteristics of teachers and students. At present, it is not yet possible to show the results of the experiment. After the collection of questionnaires (currently underway), the work will proceed with data analysis. By the end of October 2022, it is expected the presentation of the results of both the evidence on teachers (before and after the intervention) and the processing of pre-questionnaires for students. That being said, it is now possible to illustrate what emerges from the initial analysis, still of a purely descriptive nature, of the 139 pre-questionnaires for teachers. From a comparison with the national teacher population, the considered sample appears to be representative at gender and age level (the only open-source information available). Almost all the sample is composed of female teachers between 36 and 65 years old who has never attended an economic and personal finance course or took part in a financial education project. The financial issues are generally little studied and, except for banks, the level of confidence in financial players is very low. Despite 80% of teachers have saved in the last year, more than half of them have not invested and one out of three deposited all the savings in the bank account. Male teachers, while showing a greater interest and study of the financial matters, do not invest in any of the financial instruments proposed in the questionnaire, also because of their younger age. Those who invest, indeed, are older and, regardless the level of education obtained, they probably do it because of their greater economic stability and disposable income.

Keywords: policy evaluation, randomized experiment, financial literacy

A, B, or C? Question format and the gender gap in financial literacy

Maddalena Davoli

Financial literacy surveys, almost exclusively based on multiple-choice questions, have consistently highlighted the existence of a gender divide in financial knowledge. To the extent that financial literacy is a driver of financial inclusions and more savvy financial behaviors, it is a policy-relevant goal to understand the extent of women's disadvantage in financial knowledge and the reasons behind it. Gender differences in financial literacy levels have been hard to explain, and scholars have not yet found a definitive answer. What has not yet received much attention in the financial literacy gender gap literature is the way financial literacy is measured and how this may relate to the observed differential patterns across genders. The current paper aims at filling this gap. More specifically, analyzing the difference in gaps related to the use of multiple-choice testing formats versus open-response ones, I question whether the tools used to measure financial literacy can themselves amplify the gender gap in performance. In order to do so, I employ the financial literacy module of the PISA 2015 assessment, hence focusing on gender differences among country representative samples of 15-year-old students. In this paper, I exploit the unique characteristics of PISA data to identify the effect of question formats on gender gaps in financial literacy. Having answers to both multiple-choice and open-response questions for each student allows to estimate within-student effects of question format on the probability to answer correctly financial literacy test items for boys and girls. This panel-like specification also allows controlling for student-invariant characteristics, such as unobserved cognitive skills, family background, and underlying non-cognitive skills. As a first result, I find that while on average 15-year-old girls do not show lower overall financial literacy as compared to boys, a gap is found when differentiating between multiple-choice and open-response questions. More specifically, girls' likelihood to correctly answer financial literacy test items is about 5% lower when the question is formulated in a selected-response format. In contrast, no gap is found for constructed-response ones. The result is robust to controlling for a wide array of individual and contextual factors, such as students' direct financial experience, cognitive abilities, and non-cognitive skills, contrary to much of the previous literature on the topic. Importantly, also gender differences in factors commonly suggested by the literature as drivers of such item-by-gender differences (such as motivation, confidence and propensity to guess) do not seem to play a role in a low stake context such the PISA one. I suggest that the gender-by-format effect appears to be explained by the cognitive process and mental strategies that test-takers need to engage in to answer assessment items: multiple-choice format is more commonly used to assess skills related to analyzing and identifying financial information, a cognitive area where boys are doing better. At the same time, girls are particularly successful when answering questions that require them to evaluate or explain financial issues, commonly tested with open-response items. In a further result, I show that the estimated interaction between gender and items format is no longer significant once we exclusively consider schools that consistently assess students' competencies through standardized test. This result is quite important as it suggests that the negative performance of female students in selected-response questions can be mitigated if the schools actively engage policies aimed at training their students for such a format of tests. Since its introduction in the 2004 Health and Retirement Study (Lusardi and Mitchell, 2011), the standard measure of financial literacy in empirical studies consists of a set of 3 to 7 multiple choice questions testing the understanding of basic concepts such as interest, inflation, and risk diversification. The reason behind the use of multiple-choice to measure literacy levels is relatively straightforward, as it allows to effectively and objectively assess large fractions of the population. However, in the Education Science literature, there is evidence that there exist dependencies between respondents' test results and test format, with multiple-choice testing tending to favor males over females, and still, research on the issues of test bias in financial literacy assessments is scarce. Hence, this project contributes to the existing literature in different ways. First, it provides an alternative explanation to a well-consolidated finding in the household finance literature and rises awareness on the general way financial literacy is tested in household surveys. It also speaks to the growing literature on the role of standardized assessments and on the question of what they precisely measure, as personality traits and non-cognitive skills have been found to be relevant on the final test performance across different groups of individuals. Previous literature has observed a gender difference in performance in multiple-choice tests, in part explained by women higher tendency to skip questions in standardized tests and by overall gender differences in non-cognitive traits such as willingness to guess, confidence and risk-aversion. However, these studies are often affected by issues related to small sample size, the inability to compare directly multiple-choice and open-response items, or the fact that they

focus on specific subjects samples and high-stake contexts (such as entrance and university exams). To the best of my knowledge, this is the first large-scale empirical analysis that attempts to extend the validity of such previous studies while investigating the interaction between gender and question formats in the financial literacy domain. The project results are quite relevant, especially in light of the very uniform way in which financial literacy is tested (i.e., by means of multiple-choice questions), and suggest the need to ensure fairness in financial literacy assessments.

Keywords: gender, financial literacy, PISA, within student estimate

The effects of online financial education on student achievement: evidence from a randomized trial

Emilio Barucci - Tommaso Agasisti - Marta Cannistrà - Mara Soncin

Financial literacy is currently considered to be one of the key competences that individuals must owe for living in modern societies and economies (Remund, 2010). Several factors influence the necessity of acquiring financial abilities during the lifetime: the increasingly complex rules of financial markets, the diminishing role of welfare services provided by the public, longer life expectancy (Lusardi & Mitchell, 2014). In such a context, individuals are called to make informed decisions about a number of issues and problems that require, for instance, to understand how to save money for the future, to invest money in a productive way, to protect their own financial data, and so forth. The positive effects of financial literacy at the aggregated level (i.e. economic and social returns: Capuano & Ramsay, 2011) call governments and institutions into action, to ensure that adequate levels of financial competencies are acquired across the population (Hastings et al., 2013). As for all types of skills and competencies, financial literacy can be improved by means of educational interventions. At the same time, international evidence is available about the scarce attention of schools and Higher Education institutions (HEIs) in including financial education in educational programs (OECD, 2005). The situation is changing rapidly in many areas, because several national and international agencies and governments are stimulating a specific effort to increase the level of financial literacy, especially among the youths. For instance, the European Commission started in 2012 to promote financial education, especially for young pupils, providing the main guidelines to promote a set of financial education programs, also considering the differences among European countries. Lastly, in occasion of the 2013 Russia's G20, OECD promoted a publication inviting G20 countries to advance a national strategy for financial education. As a response to these stimuli, in many countries the governments have promoted "national strategies" for developing financial education interventions which aim at targeting the financial literacy of various segments of the population. The Italian case is of particular interest. On one side, the international benchmarking exercises realized by OECD demonstrates that Italian 15-year-old students (tested in the Programme for International Student Assessment, PISA) have very low scores in financial literacy tests when compared with other developed countries. In fact, as pointed out by PISA 2012 and 2015 country reports, Italian students are lagging behind their counterparts from developed countries (OECD 2013; 2016). At the same time, the Ministry of Education launched a coordinated initiative for developing financial education in 2009 (agreement with banks, institutions and consumer associations), and since then a new attention to the topic has been actively demonstrated by the schools. Moreover, a new inter-institutional action has been taken in 2015, with the participation of Bank of Italy, several Ministries (Economy, Education, Social Policies, etc.) and Authorities: they all together created the so-called Committee for Programming and Coordinating Financial Education. The objective of this Committee is to monitor and coordinate the various initiatives of financial education realized by schools, institutions and organizations. Investing in financial education is a worthwhile policy only to the extent to which the effectiveness of the specific interventions is demonstrated. Therefore, effectiveness should be assessed on the basis of educational success in raising the knowledge of targeted topics and contents of financial literacy, as well as in influencing actual economic behaviors in real circumstances. Thus, each specific action and initiative should be ideally evaluated by means of robust statistical and econometric techniques, for establishing the causal nexus between the educational activities and gains in the acquisition of specific knowledge and skills. While the number of educational interventions is quite relevant nowadays (Walstad et al., 2017), convincing evidence about their effectiveness is much weaker. Some recent reports call for

more effort in producing assessments that can shed some light about the real effects of formative actions specifically devoted to financial literacy. This paper describes a specific educational initiative realized in a major top-ranked university in Italy and assesses its causal effect on student achievement. A specific feature of this activity is that it uses online learning for transmitting knowledge of basic financial concepts. Actually, the main aim of the experiment reported in this research is to assess whether an effective financial education lecture can be conducted with the same effects online or in traditional in-presence mode. The target of the initiative is a cohort of freshmen enrolled to a course of Business Economics in the first year of the BSc in "Mathematical Engineering". Specifically, students were taught a 3-hours module on basic financial concepts, related with bank accounts, simple/compound interest rates, differences between shares and bonds, loans and mortgages. While half of the students attended the class in person, the other half were exposed to an online lecture equivalent to the content taught in the class. The results highlight that both groups of students experienced an increase in their knowledge of financial concepts, and that there are not statistically differences between the two groups on improvement of knowledge. This latter finding is encouraging and suggests using online learning for developing low-cost, effective, short interventions on financial education. The present paper contributes to the current academic debate in two innovative ways. As far as we know, this is the first experimental evidence of the effectiveness of a financial education intervention in an Italian university. In general, the experimental evidence on the impact of financial literacy initiatives is limited, and is much more concentrated in the context of primary and secondary education. No previous experiments have been conducted in Italian higher education. In addition, this research explores the relative effectiveness of two different models of delivering the same content (online vs live-only class), underlining the importance of critically defining the design of specific interventions. In this perspective, this paper contributes to the (still limited) stream of the empirical literature that analyses the impact of employing online education on student achievement, basing the assessment on rigorous experimental protocols. The remainder of the paper is organized as follows. The next section §2 synthetically reviews the state-of-the-art of the literature that deals with the effectiveness of existing financial education initiatives. Section §3 describes the experiment and the empirical analyses conducted to test the effectiveness of the educational program. Section §4 reports the main results and discusses them critically. Section §5 concludes, deriving policy and managerial implications.

Keywords: finance literacy, online teaching

Gen Z, personality traits and sustainability: an econometric investigation

Giovanna Paladino – Luciano Canova

The aim of this study is to answer the following question: "How does Generation Z perceive the link between the issues of economic and environmental sustainability?" Sustainability education is increasingly at the center of policy makers' agenda, as demonstrated by the Sustainable Development Goals (SDG) initiative, approved in 2015 by the United Nations (UN) and defined as a framework of 17 objectives in a roadmap toward achieving a more sustainable economy in 2030, and by the centrality of Environmental, Social and Governance (ESG) issues in business strategies. The issue of sustainability has become the subject of investment programs, which have significant monetary impacts, as shown by the European Union commitment to allocate 30% of the 1,800 billion allocated for the 2021–2027 budget for the transition toward a decarbonized economy. The 360° vision of sustainability also includes specific attention to economic-financial education: man and the environment have no sustainable interaction without careful and rational management of economic resources. Less than 40% of individuals in Italy have financial literacy, with significant inequalities in terms of gender, educational qualification, and at least in part, territorial distribution. Levels are also very low among students. According to the latest OECD PISA survey, the percentage of Italian students that can solve the most complex tasks (top 5-level performer) is less than half that recorded at the OECD average level (4.5% vs 10.5%), while about one of five students lack the minimum skills necessary to make responsible and well-informed financial decisions. The results of an analysis by the Bank of Italy on the level of financial literacy in 2020 (D'Alessio et al., 2020) confirmed the delay of Italians. The survey uses the OECD methodology, which derives an overall indicator of

competencies starting from the scores calculated for three subdimensions: knowledge, behavior, and attitudes (or attitudes). The Bank of Italy study, through an econometric analysis, showed only a slight improvement in the knowledge component, while behaviors and attitudes are slightly worsening. The intent of our research was to investigate a segment of the population that is not normally included in the surveys to understand the sensitivity to environmental issues and the relationship the latter has with the awareness of the use of money. The aim was to identify any spillover between the two dimensions, which could be useful from the perspective of public policy design and therefore focuses on the above-mentioned attitude component and potential effectiveness of the educational interventions that exploit the overlap between the environmental dimension and use of money. The question, though of great importance, has not yet been the subject of careful analysis in the literature. In fact, only a few contributions have investigated the attitudes and behaviors of Generation Z in terms of consumption and sustainability. For example, Li and Leonas (2022) presented the results of an analysis of a sample of 257 young women with reference to the purchase of swimwear. The authors found that price is the key factor but is accompanied by elements such as the materials used in the production of the apparel and information concerning the sustainability of the production process. Another study (Bollani et al., 2019) based on data from 267 university students of the millennial generation focused on the relationship with food, particularly highlighting how the information and actions aimed at reducing food waste and waste generation are increasingly important. Beyond surveys or questionnaires that contain specific sections dedicated to environmental sensitivity, such as the European Social Survey of 2018, which has a thematic focus on global warming, not many studies have focused on the younger population and examined the relationship between environmental sustainability and attitudes in the use of money. Some literature reviews have focused on the role of sustainability education from childhood. For example, Breßler et al. (2017) established a taxonomy of the characteristics and learning objectives of the Education to Sustainable Development paths, more importantly identifying a framework that can guide research, even empirical studies, to examine their impacts. In a meta-analysis, Somerville and Williams (2015) highlighted how the number of publications dedicated to the topic of sustainability education has increased significantly over the last few years by identifying three lines along which the research has developed: connection with nature, children's rights, and theoretical frameworks. An interesting study is that of Bamberg and Moser (2007), who conducted a meta-analysis of psychological articles published over the last few decades that reported the main results regarding the characteristics/behavioral components that correlate with environmental sensitivity. This is an article of interest for the purpose of our research, as the following analysis delves into the dimension of character traits. Another study that sought to investigate the relationship between environmental sensitivity and other specific skills is that of List et al. (2020), which used data from OECD PISA survey and compared the linguistic, mathematical, and scientific skills of 15-year-old students at an international level. The research highlighted the correlation between scientific skills and the development of awareness of the issue of sustainability. Indeed, the only extant study that considered sustainability from both environmental and economic points of view for children between 23 and 26 years old is that of White et al. (2018). On the basis of a series of information relating to declared intentions, to the answers to some questions relating to the knowledge of financial concepts, to saving behaviors, and to the sense of trust and self-control, the authors found a positive relationship between attitudes to environmental sustainability and good money management practices. However, the study lacked sufficient econometric evaluation, and this invalidates any inference from the points of view of statistics and policy indications. Our study examined the relationship between environmental awareness and the attitude of Generation Z toward the use of money in Italy through a representative sample of the population composed of 400 young people between the ages of 13 and 18 years. The empirical analysis was conducted from the construction of two synthetic indicators using a multivariate statistical technique to analyze principal components. MONEY INDEX and GREEN INDEX captured sensitivity to the use of money and environmental resources, respectively. Both indicators have been used in different econometric specifications as dependent variables to explain which factors correlate with them and to determine whether the two variables overlap. The correlation index between the GREEN INDEX and MONEY INDEX, equal to 0.41 and significant at 1%, shows a clear and close statistical association between the two dimensions, later confirmed in the econometric analysis. The probability of belonging to the last quartile of the environmental sustainability indicator is also strictly connected to that of belonging to the last quartile in regard to the attitude toward the responsible use of money. As for the variables that correlated with the two dependent variables some common traits and differences emerged. Character traits had a significant impact on both dimensions, with the propensity to trust others and curiosity playing important roles. Young people who show greater confidence and curiosity are also more

likely to be more sensitive to the environment and responsible use of money. Scrupulousness and sociability are also significant variables for environmental sensitivity and the use of money, having positive impacts on both. The main differences were in the external variables, for which interesting specificities have been reported. If the cultural condition of the family has a significant impact and with the expected sign on the propensity to responsible use of money (therefore, higher levels of cultural background correspond to higher levels of sensitivity to the use of money), such an effect is not significant with regard to environmental sustainability. The role of the family as a role model and the type of school are more relevant with regard to the use of money, while they have a residual impact on environmental sensitivity. A possible explanation could lie in the fact that the use of money, for many young people, represents a practical skill that they already exercise through personal management of small sums, as evidenced from our own dataset, or that they observe closely in their role models in the family. Conversely, education on environmental sustainability, in some respects, may lack a practical correlation that links a specific behavior to the social norm. Obviously, due caution must be exercised when interpreting the data. The present survey provides a significant statistical association, but we believe that more insights can be gained from further research aimed at more clearly isolating the causal link between the two dimensions. From the point of view of public policy orientation, the spillover between aptitude in the responsible use of money and environmental sensitivity could translate into efficient use of monetary resources to achieve a dual purpose. If education on responsible use of money is also associated with greater awareness in the use of natural resources, economic and financial education can turn into a formidable tool for education for sustainability according to the 360° definition that also emerges from frameworks such as the UN 2030 Agenda.

Keywords: sustainability, environment, financial education, GenZ

THEME 2. DIFFERENT SOURCES OF DATA AND THEIR INTEGRATION: POLICY INDICATORS FOR THE EDUCATION SYSTEM TRAINING

ORGANIZER: INVALSI - ISTAT

COORDINATOR: BARBARA BALDAZZI

OCTOBER 27TH: 2.00 P.M. – 4.00 P.M. {ROOM 1B ANNAMARIA – RESEARCH 2}

Exploring the predictive power of standardized and non-standardized evaluations on Italian university freshpeople's performance.

Gabriele Lombardi - Giulio Ghellini

Recent studies on Italian students' performance at the Tertiary Education level show how the Secondary Education career is significantly able to determine freshpeople's success (D'Agostino et al., 2021; 2022). Nonetheless, researchers are forced to employ only the type of school attended and students' final mark at graduation in order to obtain hints about the effect of Secondary Education on academic success. This, because of the lacking of a strong integration between university and high school careers data, to the point that the type of high school is sometimes employed as a proxy for students' socio-economic background, with all its limitations. Nonetheless, thanks to the integration between data from National Student Register (ANS) and from INVALSI database, finally it is possible to obtain a broader view about the influence of Secondary Education patterns on Tertiary Education careers in Italy. Indeed, it is not sufficient for students to choose a coherent transition between the two educational systems, in order to succeed in the selected academic program (Bone & Reid, 2011), but it is necessary to jointly analyze both preexisting performance and reference context. As an example, Aina (2012) highlights how university success still suffers for the intergenerational correlation, making much more difficult for low-income students to accomplish Tertiary Education degree. Moreover, Arpino et al. (2019a; 2019b) show how also the attended high schools themselves exhibit differences able to eventually generate an added value, which reflects itself on future individual performance at the university level. In this framework, the question arises about the effectiveness of standardized evaluations (i.e INVALSI test which measures the acquired competencies of each Italian student in the same way) and non-standardized ones (such as final mark at graduation or marks received during the academic year) for correctly measuring students' ability. The current debate highlights the necessity of combining the two evaluation systems. Indeed, they provide different information about students' profiles, on the other side being subject to different uses and misuses (Goldstein, 1993; Farrell, 2005). A way to compare the different potentials of these two kinds of evaluations lays in asking ourselves which of the two is able to better predict the university performance, jointly with demogrphic and socio-economical individual factors and with school characteristics. Thus, it is possible to take into account also the hypothesis that evaluation could not be at all good predictors of future performance. • Research question: Investigating if and in which measure results from INVALSI test can be considered as good predictors of first year university performance with regard to individual, socio-economic and school characteristics. Moreover, exploring if standardized evaluations should be considered better predictors, rather than high school final mark and academic year's grades (non-standardized evaluations). • Data: Database MOBYSU.IT [Mobilitá degli Studi Universitari in Italia], research protocol MUR - Universities of Cagliari, Palermo, Siena, Torino, Sassari, Firenze, Cattolica and Napoli Federico II, Scientific Coordinator: Massimo Attanasio (UNIPA), Data Source ANS-MUR/CINECA. Data - drawn from the Italian "Anagrafe Nazionale della Formazione Superiore"- has been processed according to the research project "From high school to the job market: analysis of the university careers and the university North-South mobility" carried out by the University of Palermo (head of the research program), the Italian "Ministero Università e Ricerca", and INVALSI. Analyzed data refer to the cohort of freshpeople 2019/2020, who have sustained INVALSI test and high school final examination in the school year 2018/2019. • Methods: Exploratory Analysis based on models with cathegorical dependent variable. Accordingly, the dipendent variable will be a dichotomic indicator, assuming value 1 if a freshperson drops out university degree course or achieves a number of credits (CFUs) less than 5 (university failure), 0 otherwise. In a first instance, the analysis will consider only covariates regarding socio-demographic charactersics (e.g. ESCS, gender, geographical residence…) and school attributes (school type, school ESCS…). Following, this model will be compared with two alternatives, adding as regressors: i) variables regarding high school final mark and grades received in

Italian language and Mathematics during oral examinations (non-standardized evaluation); ii) INVALSI results in Italian language and Mathematics (standardized evaluation). Then, predicted probabilities will be extracted from these three models, comparing the predictive power of each model, so to understand: i) if models considering evaluations predict better than the one without them; ii) If the model with INVALSI results predict significantly better than the one with non-standardized evaluations. The accuracy of each model could be compared also employing a Naive Bayes algorithm. Moreover, robustness of results will be chacked estimating a new model with a dependent variable assuming value 1 for those students who have achieved a high number of CFUs (ideally more than 30). • Preliminary results of conducted analysis seem to indicate that adding covariates relatively to evaluations always improve the ability of predicting freshpeople's university performance. Nonetheless, the so-called non-standardized evaluations appear to be better predictors than standardized evaluation based on INVALSI results.

Keywords: competencies, performance, assessment, university, secondary education

School, distance learning and competence levels: differences by territory

Barbara Baldazzi - Claudia Busetti - Silvia Montecolle

It is difficult to capture the causal effect of DAD on learnings because these are related to various factors such as the lack of electronic devices in the family or school, frequent connection problems, loss of social skills, prior school situation, and others. In the school year 2020/21, a sizable share of schools, 81%, activated remote teaching at least once during the year, and only 3% of schools conducted exclusively face-to-face classes. The activation of remote teaching has occurred with varying frequency and intensity. When analyzing the percentage of hours conducted at a distance in secondary schools, hours in distance teaching exceeded those in-presence (57%). Moreover, in southern schools, the share of hours carried out at a distance exceeds the national average value by 20 percentage points. In contrast, distance learning is less frequent in the Northeastern regions, particularly in the autonomous province of Trento where it reaches the lowest value. A principal component analysis (ACP) was conducted at the regional level and a subsequent composite indicator was conducted to synthesize information from different sources available for secondary schools . The indicators considered concern, in addition to the 2021 competence levels of students in the last year of secondary school and their change from the 2018/19 school year from the source INVALSI, the critical issues that the school system has had to deal with as a result of the pandemic: distance learning and related informatics problems, student perceptions, increased teacher turnover as a result of restrictions in territorial mobility and quarantine and self-supervision measures (source Istat). The analysis could later be enriched by also considering the latest data on students in the school year 2021/22. The main results of the first analysis conducted are presented below. The first 3 components extracted collect 79% of the variability of the collective. The first component (49%) is represented on the negative semi-axis by the variables indicating greater difficulty toward distance learning. On the positive semi-axis, on the other hand, are the variables on poor skills achieved in both Italian and mathematics, more frequent use of DAD, greater use of substitute teachers than in the school year 2018/19, and less internet presence in the family. On the negative semi-axis are projected the northern regions with the exclusion of Friuli Venezia Giulia and Liguria, while on the positive semi-axis are six southern regions (Sicilia, Abruzzo, Basilicata, Calabria, Campania, and Puglia). The second component (19 %) is characterized on the negative semi-axis by the variable related to the demand for electronic devices (PCs, tablets) made by students to schools and on the positive semi-axis by the variables indicating greater negative variation in numerical and literacy skills. On the positive semi-axis are projected Veneto, the Autonomous Province of Bolzano, Friuli Venezia Giulia, Marche, Liguria, Abruzzo, and Puglia, regions where the decline in learning was highest even though, for students in the northern regions, average results still remain higher than for students in the south. The third component (11 %) is characterized on the positive semi-axis by variables derived from students' reports on the preference of face-to-face teaching to distance learning, the negative influence of distance learning on scores and connection problems; the regions projecting on this semi-axis are Marche, Sardegna and Campania. The

composite index calculated on the three components shows North-South and Islands dualism with some exceptions. The northern regions lead the ranking of regions that have coped better with the pandemic and the consequences on the school system with the exception of Friuli Venezia Giulia and Liguria, which are in the middle of the ranking. Viceversa, Molise and Sardinia diverge from the southern regions (positioned at the bottom of the ranking) due to better performance in learning and internet presence at home. In contrast, students in Puglia suffered a higher loss in learning. The difficulties of the health emergency did not substantially change the geography of learning inequalities compared to the school year 2018/19, but a widening of difficulties is observed for some regions in the South and Islands, partly due to the problems schools and families have had in adjusting to the required changes. Enriching the analysis with data from the last school year could provide added elements to deepen the relationships between the different aspects considered. The variables used in the analysis are as follows: a) Source INVALSI: Alphabetic=Inadequate level of literacy (students in grade 13) 2020/21, Var_alphabetic=Inadequate level of literacy (students in grade 13) change 2020/21 vs 2018/19, Numerical=Inadequate level of numeracy (students in grade 13) 2020/21 Var_numerical=Inadequate level of numeracy (students in grade 13) 2020/21 vs 2018/19. b) Source Istat, Survey on the inclusion of pupils with disabilities 2020/21: DAD=Teaching hours allocated to distance learning (excluding quarantines) in secondary schools, percentage values of total planned teaching hours, Devices= Secondary school students who applied for devices, percentage values. c) Source: Istat elaborations on Ministry of Education data: Substitute teachers=substitute teachers in secondary schools, percentage change, 2020/21 vs 2018/19. (d) Source: ISTATI, Survey of Children and Youth: behaviors, attitudes and future plans Year 2021: Prob_Connection= Secondary school students who report that connecting at home sometimes gives problems, percentage values, Preference_Presence= Secondary school students who report that they prefer teaching in presence, percentage values, DAD_Fatiguing= Secondary school students have taken distance learning and who report that distance learning is more tiring, percentage values, Scores_negative= Secondary school students have taken distance learning and who report that scores are negatively affected by distance learning, percentage values. e) Source: ISTATI, Survey on Aspects of Daily Life Year 2021: No_Internet= Households reporting that they have at least one computer and Internet connection, percentage values (polarity reversed to conform with other indicators).

Keywords: distance learning, integration sources, skills, turnover

Not only privacy. Costs and benefits related to the introduction of more restrictive criteria in the dissemination of elementary data

Lorenzo Maraviglia

In our country, the implementation of the new European regulation on protection of personal data (EU regulation 2016/1679) went hand in hand with a widespread tendency to restrict the quantity and quality of information and elementary data accessible to researchers, in particular aggregated or elementary data provided in open formats (open data), downloadable by anyone without particular restrictions (or bonds of belonging to specific institutions). This marks a drastic inversion with respect to the ideas and orientations prevailing in the previous years, when the movement for the opening and dissemination of data (Open Data Movement) had spread even within Italian Public Administration, prompting many Bodies to make the contents of their archives publicly available - sometimes in hasty ways and without an adequate assessment of quality of data. The risk, here, is an interruption of the process of modernization of the bureaucratic apparatus, as well as the closure of existing channels of exchange and communication between different levels of the State and between the State and the players in the market and the civil society; that would be a pity since the discussion on the potential of data is one of the main tools through which the issues of Information and Knowledge Society can penetrate within the conceptual horizon and the daily practices of the public administration, questioning the self-referential behaviours and obsolete routines which constitute an objective obstacle to the growth of the Country. In this scenario, the organizations that perform important functions in the field of collecting and producing statistical data - INVALSI, ISTAT, Ministries, ISFOL etc. – are forced to make critical decisions, acting in a critical scenario. One of the risks is to take all privacy issues as external – pre-cognitive – constraints delimiting the field of what can be

effectively “researched”. Another possibility is taking cautiously a preemptive attitude and decreasing the level of resolution at which data are made available. In such cases there is a push to aggregate: i.e. municipalities into provinces and provinces into regions; or school types into macro-types; or nationalities into overall classes (Italians, EU foreigners, non-EU foreigners). In this regard, there is a large literature, including manuals, which analyzes the risks of "disclosure" related to the dissemination of elementary data and disaggregated statistics, and which proposes a series of techniques of perturbation, aggregation, etc. etc.. However, there is no detailed analysis of the implications that a choice of aggregation or deletion of variables (or categories of variables) may entail; this, in fact, is a problem that cannot be tackled in abstract terms, but in concrete terms, case by case. Information is, ultimately, a function of the variability with which concrete phenomena occur in the various fields. By aggregating we destroy information; sometimes it must be done to defend the privacy of people (and their confidence in the statistical system); but it is necessary to have a clear perception of what we are losing. In other words, an analysis of the costs and benefits linked to the reduction of the information content of a statistical data set, in order to allow its dissemination in a secure way, is required. This presupposes focusing on the contents and the levels of variability that characterize the social and economic phenomena that are the object of research. This contribution aims to contribute to such issues - and, above all, to suggest elements for the development of a systematic method through which issues can be addressed in the context of a dialogue between subjects responsible for the production/dissemination of data, data protection officers, academic researchers and policy makers - through the presentation and discussion of some very topical examples that draw from different sources. The first of them analyzes the consequences, in terms of loss of ability to grasp the fundamental implications and development prospects of social dynamics, which derive from the suppression of the variable that identifies the province from the micro-data for public use of the Survey on the Labor Forces of ISTAT. More precisely, we will show that the availability of information about the respondents’ province of residence, together with that on nationality, allows us to reconstruct a highly informative picture of the differential trends of early school leaving. By observing the differences at the provincial level in dispersion trends, and by linking this information to that about the trend of migratory flows, it is possible to draw implications and make predictions that can enlight and inspire the political decision-making processes. The second example compares the contents that can be derived from the analysis of the micro-data of INVALSI sample with those obtained from the analysis of INVALSI population. In the BIG DATA era, the debate on the usefulness of high quality sample collections, less subject to the risks of error, selection and distortion that affect administrative databases or that (as in the case of INVALSI) derive from a generalized but less controlled data collection, it is particularly stringent. As we will have the opportunity to argue and show practically, both levels of knowledge are necessary and complementary to each other for the definition of a cognitive framework that is adequate to the challenges we face. In particular, the representativeness and quality of the sample can allow us to focus on the structural trends in the educational system in a sufficiently robust way; this is a useful tool for identifying any distortions that may be present, for example at a local level, in the population data; at the same time, the overall picture of the territorial, social and typological variability returned by INVALSI population analysis provides elements to evaluate the potential limits of the sample and understand which conclusions can be based on it - and which problems, on the other hand, require further investigation or collecting additional information. This contribution is based on the conviction that, in order to achieve important results in the present context of increasing complexity, one must strive to bring together different elements and sources of information. Without the comparison, the exchange, the comparative evaluation of the characteristics and contents of different data sources, a real qualitative enhancement is impossible for each of them taken individually.

Keywords: elementary data, heterogeneity, information, privacy

THEME 7. THE COVID-19 PANDEMIC AND THE EFFECTS ON SCHOOL RESULTS

ORGANIZER: INVALSI

COORDINATOR: ANDRES SANDOVAL HERNÁNDEZ

OCTOBER 27TH: 2.00 P.M. – 4.00 P.M. {ROOM 3 LUDOVICA – RESEARCH 3}

The impact of the COVID-19 pandemic on students' achievements

Lucia Schiavon - Dalit Contini - Daniela Piazzalunga - Caterina Muratori

In February 2020, Italy was the first Western country hit by COVID-19 pandemic and responded to it with a tight lockdown and full school closure until the end of the school year, for a total of 15 weeks. In the following school year, school closure was administered at a local level depending on the number of infections on that period and region. In a bid to keep the school open as much as possible, especially primary and lower secondary school, school closure was differentiated according to the grade. In school year 2020/21, pupils in primary school experienced 4,5 weeks of school closure on average (from 0 to 19 weeks by region), while students in upper secondary school faced from a minimum of 10 weeks up to 24 weeks of school closure depending on the region. In this paper, we want to investigate the effect of the pandemic on Italian students' achievement throughout the grades, with a focus on learning inequalities. A growing number of studies have empirically assessed the detrimental effect of COVID-19 pandemic on students educational performance in different countries, their results are strictly related to the context. However, there is evidence of an overall learning deficit which opened early in the pandemic and remained (-0.17 standard deviation according the meta-analysis of Betthaeuser et al. 2022) In our study, we use INVALSI tests in numeracy and literacy administered at the end of grades 2, 5, 8, 10 (only in s.y. 2016/17 and in 2018/19), and 13 for the full population of Italian students (about 900,000 students per grade). Since 2019 onward, INVALSI tests have been horizontally anchored for all grades, ensuring that tests administered in different years share the same psychometric features (i.e. the difficulty level). Thanks to the horizontal anchoring, it is possible to compare the test scores obtained by different cohorts and detect possible learning trends between them given the grade. In our case, we want to assess whether the COVID cohort experiences a learning loss or gain with respect to the previous cohort. We build three datasets to compare the achievements of students of the pre-COVID and COVID cohort at the last grade of primary school, secondary school, and high school. The pre-COVID cohort performed INVALSI tests in spring 2019, while the COVID cohort performed the tests in spring 2021. In spring 2020, INVALSI tests were not administered due to school closure as a measure to prevent the spread of COVID-19 virus. We match each student observation in the three separate datasets with the achievement records in the previous national assessment performed three years before. In detail, for both pre-COVID and COVID cohorts in primary school we observe achievements in numeracy and literacy in grades 2 and 5; in low secondary school the ones recorded in grades 5 and 8; and eventually in upper secondary school the achievements in grades 10 and 13. Due to the availability of longitudinal data at the individual level, we can estimate the average impact of the COVID-19 pandemic on achievements for each grade with the following model: Y_(1ikj) = β_(0)+β_(1) C_(kj)+β_(2) Y_(0ikj)+β_(3) X_(ikj)+δ_j +e_(ikj) [1] where Y_(1ikj) is a standardized INVALSI test score in numeracy or literacy set by child i of cohort k in school j (in grade 5, grade 8 and grade 13); C_(kj) is a dummy variable equal to 1 if the child is in the COVID cohort k, 0 otherwise; Y_(0ikj) is a vector of initial skills in numeracy and literacy measured at the time of the previous National Assessment Test including the standardised test score and the marks assigned by the teachers at the end of the first term; X_(ikj) is a vector of sociodemographic variables (age, gender, migratory background, parental education and occupation); δ_(j) is a vector of school dummies, i.e. school fixed effects, which account for the large heterogeneity observed across schools; e_ikj are stochastic errors normally distributed and clustered at the class level. β_1 is the coefficient of interest: it captures the average causal effect of being part of the COVID cohort rather than the pre-COVID cohort on numeracy and literacy respectively, given previous performance. As the outcome variable is standardised, the impact is expressed in terms of standard deviations. We found that the pandemic had a large negative impact on the students' performances specially among high school students. The average learning loss in numeracy is around -0.18 for grade 5 and 8 and it increases to -0.39 for grade 13. In literacy, the average learning loss is around 0 for grade 5 and it is -0.09 for grade 8 and -0.41 for grade 13. One big drawback of the described model is that the standardised test scores used to measure previous performance were not horizontally anchored at that time. In the analysis we are

comparing achievements measured with anchored standardised test scores (absolute measure of performance) controlling for previous achievements measured with standardised test scores within cohort (relative measure of performance within cohort). The absence of anchoring of the previous performance test scores does not allowed us to directly compare previous achievements between cohorts. Therefore, the estimated average treatment effects may be biased. To tackle the "anchoring" issue, we propose to focus on the relative position of different groups of children to evaluate the changing inequalities due to COVID-19 pandemic. We define a new model where we standardized students' performance within cohort also the anchored one. In each cohort, we obtain E(Z1) = 0; E(Z0) = 0 Z_(1ikj)= δ_(0)+δ_(1) C_(kj)+δ_(2) C_(kj)*Y_(0ikj)+δ_(3) C_(kj)*X_(ikj)+δ_j +ϵ_(ikj) [2] If we consider the pre-COVID and COVID cohort separately, we have For C=0 Z_1= α_0 +γ_0 Z_0 +λ_0 X +ϵ_0 For C=1 Z_1= α_1 +γ_1 Z_0 +λ_1 X +ϵ_1 Hence we can rewrite equation (2) in the following way Z_1 = α_0 + (α_1-α_0) C +γ_0 Z_0+ (γ_1-γ_0) Z_0*C +λ_0 X + (λ_1-λ_0) X*C + (ϵ_1-ϵ_0) The coefficients of interest are (γ_1 -γ_0) and (λ_1-λ_0), they measure the differential effects on learning due to COVID-19 according to prior skills, macro-region, gender, parents' education, migratory background. Be aware that the coefficient (α_1-α_0) does not provide any information about the average impact of COVID-19 pandemic. We found that who have lost ground in relative terms were: i) Low-achieving students (enlarging inequalities); ii) Girls in grade 5, boys in grade 13, iii) Young children with high-educated parents (reducing inequalities), iv) Southern Italy in grade 5 (enlarging inequalities), Northern Italy in 13 (reducing inequalities), v) Natives. However, the Southern Italy and migrants have lost ground because of their low initial levels. To sum up, we found that in Italy, COVID-19 pandemic had a negative and significant impact on competencies, only in math for lower grades, and it is on average much larger in upper secondary school (more than a full year of school). If in lower grades it is difficult for parents to substitute in-person teaching of math, in upper grades parents cannot substitute nor complement teaching anymore. It is important to keep in mind that upper secondary school students were exposed to distance learning for a longer period of time. Eventually, after the COVID-19 pandemic we observe large inequalities in terms of initial skills, less than expected on Socio Economic inequalities. These findings call for urgent remedial measures/tutoring to be put in place for low-achieving students, and to tackle learning loss for upper secondary school students as soon as possible.

Keywords: school closure, learning loss, inequality

Mitigating effects of school closures: learning from the Response to Educational Disruption Survey (REDS)

Sabine Meinck - Rolf Strietholt - Julian Fraillon

The Response to Educational Disruption Survey (REDS) investigated how countries approached the challenge of ensuring continuity in teaching and learning during the educational disruption resulting from the COVID-19 pandemic. The study's overarching objectives were to acquire an overview of the situation in a variety of education systems around the world and to provide policymakers and education leaders with valuable information for evidence-based decision-making. Even though Italy did not participate in REDS, it experienced a very similar situation in terms of school closures and introduction of remote learning due to the pandemic as other participating countries. Hence REDS may provide valuable insights into several aspects of the effects of school closures, that may be applicable to the Italian school system, especially when considering the reported experiences in the two European participants (Slovenia and Denmark). In an effort to answer the overarching research question: How were teaching and learning affected by the disruptions due to the COVID-19 pandemic, and how was this mitigated by the implemented measures, across and within countries? REDS investigated how countries approached the challenge of providing students with the opportunity to continue learning during the educational disruptions, and what conditions were related to these opportunities. Focusing on the evaluation of the varying situations in lower-secondary education (grade 8), REDS examined systems' and schools' preparedness for implementing remote teaching and learning; prior to, during, and after the school closures. This was achieved by collecting data on a broad range of topics related to infrastructure, resourcing, human support mechanisms, and capacities related to remote teaching and learning management. Data were also collected on the plans for and implementation

of the return to “regular schooling” following the pandemic. Data and Methods The REDS data collection took place between December 2020 to July 2021 in 11 countries: Burkina Faso, Denmark, Ethiopia, India, Kenya, the Russian Federation, Rwanda, Slovenia, the United Arab Emirates, Uruguay, and Uzbekistan. REDS collected questionnaire data from a total of 21,063 students, 15,004 teachers and 1,581 principals. Each country provided national-level data on the conditions and measures implemented. Data collected for REDS were put through rigorous sampling, data cleaning and processing steps, mimicking the procedures in place for other large-scale assessments of the IEA such as, e.g., TIMSS and ICILS, with some limitations due to the accelerated timeline and fluid and unpredictable global pandemic context in which REDS was implemented. Continuity of teaching and learning varied greatly across countries. All 11 countries that participated in REDS reported at least one period of physical closure of most schools for most students in response to the COVID-19 pandemic. The periods of school closure varied within and across countries, mostly starting March 2020, and lasting one to two months in the Russian Federation and Denmark to almost a year in the United Arab Emirates. There were also variations in the participation of students in schooling and the modes, media and teaching methods used in these periods. In Burkina Faso, Rwanda, Kenya, Ethiopia, and India varying proportions of school leaders reported that their schools did not offer any teaching and learning provisions during the disruption. In the remaining six REDS countries, all schools were reported to continue to offer teaching and learning provisions during the disruption. Where teaching and learning continued, more than half the teachers reported that they narrowed the focus of their teaching to the essential components of the curriculum. The large majority of teachers across countries reported being open to innovation and shifting priorities in the future, as well as that they believed new approaches to teaching and learning will remain to be important after the pandemic. Principals, teachers, and students perceived a decline in learning progress Student achievement was not directly measured in REDS. However, principals, teachers, and students were asked about their perceptions of students’ academic progress during the disruption. Both principals and teachers perceived a decline in student learning during the disruption, with more than 50% of teachers in all countries stating that students have not progressed to the extent that they would have normally expected at that time of year. The data collected from students were more variable in this regard. While more than half of students in most countries reported learning about as much during the disruption as they did before the disruption, about half of the students across countries also agreed that it became more difficult to know how they were progressing. Further, student assessment continued but was modified during the disruption. Help and support for students was not always available In most countries, students received help from their parents or teachers on learning topics during the disruption. Nonetheless, there was still a significant percentage of students who at least sometimes had no one at all available who could help them with their schoolwork. Many teachers acknowledged their role as important supporters of students and their parents on multiple topics regarding learning and beyond. Also, many students agreed they had one or more teachers whom they felt comfortable to ask for help. However, most teachers across countries agreed that it was difficult to provide lower achieving and vulnerable students with the support they required. Schools responded to the threat to well-being students and teachers reported declines in their well-being during the disruption to schooling. In most countries, over 50% of students agreed that they were feeling overwhelmed by what was happening in the world due to the pandemic. In countries where teaching and learning continued during the disruption, teacher workload generally increased. Schools placed considerable priority and effort into supporting the well-being of staff and students. On a positive note, teachers agreed that they felt supported, especially by their colleagues. When considering the future, the majority of school principals in most countries reported increased priorities for promoting student and staff well-being. More effort is needed to prepare schools and students for future disruptions. The pandemic was unprecedented, and schools and education systems needed to establish and implement their responses very quickly. This raised the question of the degree to which students, schools and systems felt prepared for similar disruptions to schooling should they occur in the future. The perceptions of students and school principals regarding their schools’ preparedness for future disruptions vary substantially across countries. A significant percentage of students in all participating countries do not feel very prepared or not prepared at all for such an event in the future. This important finding uncovers a need for further research on identifying those students and developing tailored measures to aid them during disruptions. It also provides the policy makers with the necessary scientific evidence to develop mechanisms to support students, teachers, and schools in the future. Vulnerable students were more likely to fall behind REDS provides a wealth of data and allows the responses from questionnaires to be considered in the context of other variables, such as socioeconomic status (SES) and gender. This is especially important for identifying inequalities in learning opportunities and concerns

about falling behind during the disruptions. Students with low SES were more likely to worry about their future education and falling behind in learning. Additionally, students with low SES were less confident in completing schoolwork independently and were more likely to not feel prepared for school closures. This is further underlined by teachers' responses that confirmed a reduced capacity to manage the needs of vulnerable students, and higher declines in learning progress, including students with special needs, and students with a migration background. Gender gaps were not consistent and all in all less pronounced. Reflections Teaching and learning mostly continued during the COVID-19 disruption with varying alternative delivery methods across the REDS countries. This was largely possible because of the flexibility, adaptability, resilience and determination of systems, schools, teachers, and students. However, efforts posed significant challenges associated with increased teacher workload, as well as with teacher and student well-being. Questions remain about whether the changes implemented during the disruption would be sustainable over longer-periods of time. Further research and consideration is warranted into understanding the factors that both led to successful outcomes for some schools, teachers, and students, but also unsuccessful outcomes for others. This may further inform both ongoing thinking about the changes to regular schooling that may persist following the pandemic and planning to address the challenges of disruptions to schooling that may occur in the future.

Keywords: school closures, COVID-19 pandemic, well-being

The REDS results for Slovenia and how they could be informative to Italian context

Eva Klemencic Mirazchiyski

Italy and Slovenia are participating in numerous international large-scale student assessments (ILSAs) as many of European countries do. As we often see in ILSAs, Slovenian vs Italian results could be similar in some dimensions. For example, in the last cycle of the International Civic and Citizenship Education Study (ICCS 2016) civic knowledge of 8th graders (although there was statistically significant difference in overall civic knowledge between 8th graders from Slovenia and Italy) was associated in both countries with many of background characteristics in the same direction, e.g. civic knowledge scores by SES variables, by language spoken at home, etc. Inequality is a concept that can be studied on a student, class, school, or regional level (Strietholt & Süttmann, 2022). Therefore, the background of our presentation is to present some dimensions of inequalities. Educational inequality is usually defined as the dependence of individuals' academic opportunities or success on their social backgrounds. Recently numerous analyses (e.g. Agostinelli et al. 2022; Darmody et al. 2021; Grewenig et al. 2021, Patrinos et al., 2022) showed that school closures during the COVID-19 pandemic increase educational inequalities or make them more evident. Patrinos et al. (2022) examined 35 rigorous studies from 20 countries, which revealed three key issues: 1. Most studies (32) find evidence of learning loss, 2. The studies consistently find different levels of learning loss by student socio-economic status, past academic learning, and subject of learning, 3. The longer the schools remained closed, the greater were the learning losses (ibid.). The same study took into consideration data from longitudinal, population level data from the INVALSI assessment - the math and reading achievement of students in grades 5 and 8 in school year 2020/21 with the achievement of students in the same grades in 2018/19 (no administration took place in school year 2019/20) were compared (Borgonovi & Ferrara, 2022), as well as analysis from Contini et al. (2021) which compared the learning achievements of two cohorts of pupils, the pre-COVID and the COVID cohort. Slovenia participated in the IEA' REDS (Responses to Educational Disruption Survey), where 8th graders, teachers and principals were part of the study; Italy didn't. However, some disruption measures during the COVID-19 seems to be similar for both countries too. Given the disruption and shifting from face-to-face classroom teaching and learning, it can be assumed that the academic progressing of students could have decreased during schooling disruptions and school closures imposed by the COVID-19 pandemic. Some studies (see Hammerstein et al., 2021, for a systematic review of 109 studies) have found that the academic performance of students has decreased dramatically during school closures. However, some studies show that the effect was not equal across students depending on their socio-economic status (SES). In some cases the studies found that lower-SES students actually benefited from school closures and using remote online classrooms, but in most cases

it was the other way around (Hammerstein et al., 2021). In Slovenia for at least a decade we are experiencing inflation of good grades. This is discussed within the expert's groups (e.g. National examination center is preparing yearly results on this issue within the Slovenian educational system), as well as in media (Zgonik, 2018; Škerl Kramberger, 2020; Kuralt, 2020; Katalenic, 2021; Kuralt, 2022). This is why we decided, beside to administer international options in REDS questionnaires (source of our data for this presentation), we added and administered some national items on grading students' knowledge during the epidemic COVID-19 in Slovenia and after that (when schools re-opened). Both aspects were administered in REDS questionnaires. While REDS is not the first study on the consequences of the epidemic for the education system in Slovenia (see: Vec et al., 2020), it is the first one providing data from representative samples on schools (and principals), teachers and students (8th graders). Therefore, the results from REDS study for Slovenia could be informative for Italian context too. This presentation will be focused on inequalities in teaching and learning during the pandemic in association with 8th graders background characteristics by attitudes on home-schooling during COVID-19 and students' perceptions for their schooling and knowledge for the future. Ending this part some plans for future secondary analysis (including ILSAs that both countries are participating at the moment) will be presented. The second part of our presentation (RQ2) will be devoted to specific topic - students' and teachers' perceptions of students' academic performance in Slovenia during pandemic COVID-19 and school closure. Research questions (RQ): 1. What dimensions of inequalities were the most critical during COVID-19 education in Slovenia for 8th graders? 2. What is the perception of 8th grade students and teachers on students' academic performance and grading their knowledge during the school disruption caused by the COVID-19 pandemic in Slovenia. Identification of specific variables used for our quantitative approach based on secondary analysis of REDS database for Slovenia (international and national options); part 1: In this approach all three questionnaires will be used (school, student, and teacher questionnaires), variables like: (a) access (IP1G04, IT1G03B, IS1G02, IS1G05); (b) social inequality from different conceptual perspectives (e.g. variables as IS1G14E-F, IS1G24F etc.); (c) background variables (SES - grouped as well as specific dimensions of SES, gender, school characteristics, home support, etc.), part 2: (a) student questionnaire (focus on assessment of their learning as well as grading their knowledge): i. from international options: background variables (SES, gender, migration status, languages spoken at home), other variables: IS1G18A-J; IS1G22A, and ii. national options: Q41 and Q42 (all items), and teacher questionnaire (focus on assessment of students' learning and grading their knowledge): i. from international options: IT1G05I-J; IT1G08B, IT1G09A-H; IT1G02 (groups into two new categories – teaching humanistic-social sciences subjects vs. teaching mathematic-technical and other sciences - because set of analysis will be done to compare those two groups), ii. from national options: Q28 (all items). Methods: The analysis strategy will employ descriptive and multivariate statistics (e.g. correlations, linear and binary logistic regressions, and structural equation modelling if appropriate). Part 1: we suppose that different frames (at different levels) and associations will be used, e.g. access ↔ background information ↔ specific items related to inequalities/specific (sub)concepts of inequalities. Our analyses will be focused on REDS reference period for Slovenia; part 2: the descriptive statistics will show if the perceptions on changes in student academic performance during closures changes. The multivariate analysis (e.g. correlations, regressions) will reveal, for example, how perception of students' academic achievement (aggregated teacher observations on school level) is related to different student characteristics. Part 1: The REDS results show significant inequalities (Klemenčič M. et al., 2022; Strietholt & Süttmann, 2022) in most cases related to socio-economic status (SES) of the families from which the students come. Inequalities in the share of parents who worked from home: 30 percentage points more parents of students from high SES backgrounds worked from home compared to students from low SES backgrounds; 7 percent scores of more parents from an urban environment. Inequalities in the proportion of students who expressed loneliness: no differences according to SES, nor between genders, nor when comparing rural - urban environment. Inequalities in anxiety about future schooling: students from low SES backgrounds are somewhat more anxious (5 percentage points more children with low SES); there are big gender differences (quite more, namely 13 percentage points, are worried girls). Inequalities in concerns about learning lag: students from low SES backgrounds are more anxious (an additional 9 percentage points of students from low SES backgrounds); there are no gender differences, nor between urban and rural environments. Inequalities in beliefs about independent planning of school work: students from the environment with low SES are less sure about it (6 percentage points more students from a high SES environment are confident about independent planning of schoolwork); between genders and when comparing rural - urban there are no differences. Inequalities in preparedness in the event of future school closures: more students from high-income backgrounds SES believes that they are ready for the latter (7

percentage point difference), there are also gender differences, namely, 6 percentage points more female students are convinced of this). Part 2: still under preparation. Additional information Results from part 2 analyses will be published in Large-scale Assessments in Education (abstract submitted and accepted already, but full article is still under preparation).

Keywords: COVID-19, schooling, inequalities, academic performance

Longitudinal predictors of mathematics achievement at the end of upper secondary school in the COVID-19 era: a cohort analysis on INVALSI data

Marta Desimoni - Rosalba Ceravolo - Cristina Lasorsa - Alessia Mattei

Education stakeholders in times of the Covid-19 pandemic require a broad empirical base to recover from the crisis and to strengthen the resilience of education systems in the future (Meinck et al., 2022). Among potentially valuable sources of education data during the COVID-19 pandemic are national assessments of students learning outcomes (National Academy of Education, 2021), which play a pivotal role in monitoring school systems and improving education quality (Greany & Kellaghan, 2012). In Italy, the National Institute for the evaluation of the education and training educational system (INVALSI) every year carries out a standardized national assessment of students' achievements in primary and secondary school. The main aim is to provide an overall picture of students' reading comprehension, English receptive skills, and mathematics achievements in Italy. After an interruption in 2020, from 2021 INVALSI national assessment results provide insights into students' achievements following the challenges of the ongoing COVID-19 pandemic (INVALSI, 2022). All students sitting INVALSI tests in 2021 experienced the COVID-19-related suspension of in-presence school lessons during spring 2020, along with strict social distancing measures in response to the COVID-19 outbreak. Italy reopened schools in September 2021, however the s.y. 2020/21 was characterized by temporary partial or total school closures across Italy (Bovini & De Philippis, 2021), along with restrictions due to the contagion waves that from time to time, required a raised level of alert. The Italian education system had to face an unprecedented challenge to ensure continuity of learning for all through online technologies, distance learning, and integrated digital education. Further, the COVID-19 pandemic placed children, adolescents, and young adults under psychosocial stress from isolation and uncertainty, with possible negative effects on their well-being which, in turn, is likely to influence their educational outcomes (UNICEF, 2021). Many educators and researchers raised concerns about the effects of the worldwide COVID-19 crisis on student academic achievement and learning inequalities (Hammerstein et al., 2021). The present research focuses on mathematics learning outcomes of students ending secondary education in the COVID-19 era. Aim. The present contribution aims at exploring individual and contextual predictors of students' mathematical achievements during the COVID-19 pandemic (Grade 13, s.y. 2020/21), considering their pre-pandemic learning levels (Grade 10, s.y. 2017/18). Predictors at individual and higher levels will be considered, such as students' sociodemographic characteristics, learning environment characteristics, and an estimate of the duration of school closures in the s.y. 2020/21 (Bovini & De Philippis, 2021). The predictive role of students' educational aspirations and interest in mathematics are also considered in the study. We hypothesized that these constructs are consistent predictors of academic resilience across time. Data and method. This retrospective study was carried out by performing secondary analysis on INVALSI data collected on the cohort of Grade (G) 13 students sitting the INVALSI national tests in the s.y. 2020/21 (T2, about one year after the COVID-19 outbreak in Italy) and the G10 INVALSI national tests in the s.y. 2017/18 (T1, before COVID-19 outbreak). The INVALSI 2021 and 2018 administration cycles in secondary school were Computer-Based (CB). In each grade, students were administered with multiple-test forms drawn from an item bank (one for G13 and one for G10) based on the Rasch model of measurement. The theoretical framework of INVALSI mathematics assessment (INVALSI, 2018) is aligned with the National indications for Liceo, and the guidelines for technical and vocational institutes, as well as with the main findings of research in mathematics education. The framework contains a strong and explicit reference to mathematics as a fundamental element of citizenship and life skills. Noteworthy, INVALSI standardized tests consider a view not only to the expected specific learning of the school grade but also to the general and permanent competencies that the student

should have acquired during his school career (INVALSI, 2018). G13 and G10 results are reported by INVALSI in terms of numerical score and proficiency levels (one scale for each grade, with ordered proficiency levels from 1 to 5). These are based on the National indications and guidelines and describe the extent to which the learner possesses the skills, knowledge, and understanding that comprise the area. Results from G13 and G10 assessments are not directly comparable because the estimates of G13 and G10 "person" parameters are not yet placed on a common vertical scale. However, considering the pre-pandemic mathematics achievements of students attending grade 13 during the pandemic can provide further insight into protective factors and possible sources of inequalities in achievements during the COVID-19 crisis. In the present research, we also considered covariates drawn from INVALSI database and from other data sources. Among those from the INVALSI database, student socioeconomic and cultural background (ESCS) and other sociodemographic variables, students' educational aspirations and interest in mathematics, class/school ESCS (and other compositional variables), school track, and school geographical area. We also included in the final database an estimate of the duration of COVID-19-related school closures across Italian regions in the s.y. 2020/21 (Bovini & De Philippis, 2021) and other regional indices from the Italian National Institute of Statistics (ISTAT). Preliminary descriptive statistics show that students' performance in INVALSI mathematics tests in Grades 10 and 13 are strongly correlated. Lower-performing students, who ended upper secondary school are likely to use basic skills and procedures mainly acquired in lower secondary school and, partly, at the end of the first two years of upper secondary school (INVALSI level 1) or knowing the basic mathematical concepts as set forth in the National Standards and Guidelines for Mathematics in the first two years of upper secondary school (INVALSI level 2) showed low performance also at the end of compulsory school (grade 10). However, a subgroup of students with average to high performance at the end of G10 resulted only in level 1 or 2 three years later. More encouraging results are those from another subgroup of students who showed persistent high performance in mathematics at the two-time points, suggesting positive patterns of adaptation in the context of adversity (Masten & Obradovic, 2006) due to the COVID-19 crisis. The multilevel analysis allows us to further explore the association between G10 and G13 variables, showing how individual and contextual factors can promote or obstacle learning achievements in mathematics during the COVID-19 pandemic.

Keywords: upper secondary school, COVID-19, mathematics

THEME 11. Evaluation of public policies in the education system

ORGANIZER: INVALSI

COORDINATOR: LORIS VERGOLINI

OCTOBER 27TH: 4.30 P.M. – 6.30 P.M. {ROOM 1B ANNAMARIA – RESEARCH 4}

The effect of classroom size on cognitive and non-cognitive skills: The Italian case

Emanuele Fedeli

A selected body of literature in economics of education has always investigated the effect of class size on students'' achievement. A thoughtful review can be found in Hanushek (2003) and Rivkin et al. (2005). The main idea is that larger classrooms negatively affect the students'' outcomes because of the negative coordination of many students. One of the main issues in this kind of literature is that class size is a powerful "clearing house" tool in the hands of school principals to compensate for plausible issues in the school setting. Indeed, school principals may allocate better students to larger classes, thus generating a positive association between class size and student performance. In principle, this peril makes difficult a causal interpretation, but previous scholarship has adopted the way of a good instrument or an experiment such as the famous Tennessee STAR experiment. A recent contribution suggests that study California's class size reduction program raised math and reading achievement by roughly .10 and .06 standard deviations from the average test scores, respectively (Jepsen & Rivkin, 2009). Literature Angrist and Lavy (1999) led the Pioneering work on class size, exploiting a quasi-experimental approach in Israeli public schools that, by law, cannot have more than 40 students in a class. Leveraging this rule, they show a negative effect. Other papers confirm these findings, such as the works of Bonesrnning (2003) for Norway, Urquiola (2006), Browning and Heinesen (2007), and Bingley et al. (2007) for Denmark. Another approach is to exploit school-cohort variations as an instrument for the classroom size (Hoxby, 2000). This is useful when binding class size limits are not available. Hoxby uses deviations from a quartic regression as the exogenous variation. Research goal: This work investigates the causal effect of classroom size, expanding the previous scholarship according to different dimensions. Firstly, we consider not only the students' competencies in numeracy and literacy but also socio-emotional skills. Indeed, these skills play a vital role in promoting lifetime success, contributing to better working conditions, good health, and low criminal behavior (Heckman et al. 2006; Conti et al., 2013; Kautz et al. 2014), especially when shaped at an early age (Almlund et al., 2011). Secondly, we leverage Hoxby's instrument to give an overview of classroom size on students' competencies across all grades and cohorts. Then, we use a case study of secondary schools to unveil the role of classroom size on socio-emotional skills. We use both of the previously mentioned approaches, the Hoxby and the Angrist & Lavy approach. Thirdly, we plan to show geographical differences and make some simulations about state investment in "building" more classrooms. Data. We use data from INVALSI-SNV, and at the beginning, we leverage several school years (from 2011/12 to 2018/19) relying on 10 million students across all grades. Then, we focus on our case study in secondary school to investigate the effect of socio-emotional skills. Our outcomes of interest are academic track choice and university aspirations measured, standardized tests in language and mathematics in the 8th grade, conceived as a proxy of their academic ability; mid-term teachers' degrees in language and mathematics, and socio-emotional skills such as attitudes toward the subject, confidence, attitudes toward school, concentration, integration, and anxiety. By exploiting the large size of the INVALSI dataset, we are in the position to disaggregate the analysis by provinces, thereby gaining a more fine-grained perspective on territorial heterogeneity in educational inequality. Methods. In the empirical analysis, we rely on OLS estimations with the inclusion of school fixed effects. Then, we correct the endogeneity of our treatment using an instrumental variable approach. Thanks to balancing tests, we show that the IV is assigned as good as random on a set of students and classroom characteristics, showing the goodness of our strategy. We also plan to test different polynomials functions to detect plausible non-linearities. Finally, we visualize geographical differences at municipal levels. The findings are preliminary and in the early stage. Such findings suggest that (1) class size is positively associated with a large array of students' outcomes, in particular, students' competencies in numeracy and literacy. Regardless of these significant associations, the effect size is smaller compared to the previous literature, in line with what was found by Angrist et al. (2017).

In the next steps, we are working on the (1) inclusion of non-cognitive skills, (2) the testing of non-linearities, (3) the simulations of "building" more classrooms, and (4) the geographical visualization.

Keywords: classroom, size, skills

Local Public Investment and Students' performance

Francesco Filippucci - Jacopo Bassetto

Educational outcomes contribute to determine numerous future choices during the educational career (e.g., whether to enroll in an academic high-school track) and the university career (e.g., which subject to study at university). Therefore, the educational performance is strongly correlated with future earnings and other labor market outcomes (Chetty et al., 2011). While the socio-economic background and innate ability play a decisive role on students' educational performance, also the educational context in which students are raised is a crucial determinant (Chetty et al., 2019; 2020). In this project we aim at examining the role that school-level interventions have on students' educational outcomes. Schools may spend a wide variety of items that affect students' educational performance, such as teachers' training, mentoring programs, school infrastructures. Previous studies have shown that targeted interventions such as mentoring can reduce educational inequalities and improve educational outcomes (Oreoupoulos et al., 2017). Other studies have shown that cuts or increases in school financing matter for students' educational outcomes by improving or reducing the quality of services and infrastructures (Jackson et al., 2016; 2021, Pavese & Rubolino, 2022). In this project we aim at combining these different strands of literature and evaluating the effects of a large funding scheme, PON-SCUOLA 2014-2020, on students' educational outcomes. The PON-SCUOLA finances not only a large number, but also a wide variety of projects in Italian schools across all educational levels. Projects range from building maintenance to WLAN connection, to counselling programs. While some projects directly target the risk of drop-out and educational poverty, others may affect educational outcomes by improving the quality of teaching and of the school environment more broadly. Understanding the extent to which these interventions are implemented and affect educational outcomes is central both in the academic debate and in the policy agenda. Our research project aims at evaluating the effects of different schools' interventions on students' educational performance and choices. To this aim, we plan to evaluate the funding scheme PON-SCUOLA which is now at its third edition and previously occurred in the periods 2007-2013 and 2014-2020. PON-SCUOLA is a generous European-level funding scheme that aims at reducing educational inequalities and improve educational outcomes in Italians schools. The funding scheme is divided into different areas of interventions (assi) whose starting dates and amount of available funding vary both geographically and temporally. When applications open for a specific asse, schools may candidate their projects. Projects are then evaluated and ranked based on their assigned score. The schools whose projects are approved receive the funding and can implement the projects. Our research project has four main goals. First, developing a methodology that allows us to evaluate the causal effects of the PON projects on the size/quality of interventions and on educational outcomes. Second, we aim at implementing our empirical strategy to both evaluate how funds are received and used by schools and to estimate the causal effect of the overall amount of funding per-pupil that schools receive. This first step allows us to compare our study with previous research on funding increases and cuts. Third, we aim at exploiting both the wide variety of projects and the richness of educational data to explore the heterogeneity of these effects along two dimensions: the types of projects (e.g., infrastructure, counselling), the types of students (e.g., with migration background, with different socio-economic backgrounds). Data. We use four different sources of data. The first one is data from the Italian National Institute for Evaluation of the Education and Training System (INVALSI). INVALSI runs yearly standardized tests in Italian, Maths and English, administered nationally to students of the second and fifth year of primary school, third year of lower secondary school, second and fifth year of upper secondary school. The pupils also complete a questionnaire to collect information about the socio-economic characteristics of their families (e.g., parental nationality, education and work status), and student characteristics (e.g., gender, age, birthplace, childcare and kindergarten attendance). The second source are the official rankings of the proposed school-level projects for each region and each tender for the PON-SCUOLA 2014-2020. These rankings are publicly available on

the website of the PON-SCUOLA, and they were scraped and digitized by the authors. The third source is OpenCoesione, which reports detailed information on the actual project implementation (amount requested, amount received, timing of implementation). Finally, we also use Open Data from the Italian Ministry of Education (MIUR Open Data). This data provides information about the aggregated characteristics of each school in terms infrastructure and services, and the students' population. Since school-IDs are anonymized in INVALSI data, we use only information collapsed at the municipality and school grade level and select PON project applications in municipalities that have at maximum one school per grade. We will then merge the dataset at the municipality-grade-year level. Methodology The PON assignment system offers an opportunity for a natural experiment based on a Regression Discontinuity design, similarly to Cingano et al. (2021) and following Fort et al. (2022). Namely, PON funds will be assigned on a first-ranked first-served basis based on regional rankings for each project. There is also a minimum score for being considered eligible ("Valutato") for some tenders. To study the effect of the funding, one can compare the last schools that received funding with the one who had a very similar but slightly lower score and didn't receive funding. Identification stems from the fact that schools who are just above or below the threshold for receiving funding will have similar tender scores and will not report systematic differences in observable and unobservable variables that may be correlated with potential outcomes. This method is considered the "second best" after random assignment for its robustness to the threat of endogeneity. Our preliminary results show first that the first stage is strong. The results suggest that schools just above or just below the threshold for a specific tender receive 42,564 Euros more on average of PON funds (left panel), an amount which is very close to the average amount assigned in PON tenders. This corresponds to 88 Euros on average of extra funding per student. The effect varies substantially for different tenders: for example in the case of the tender "Arredi innovativi" schools can be granted up to 100,000 Euros. The next steps of the project will be to study 1) how much PON grants correspond to actual additional received money, using detailed information on projects roll-out available in Opencoesione and data on school infrastructure over time from MIUR Open Data, and 2) the effect of PON funding on Italian, Math or English test scores and on survey variables from INVALSI. Preliminary results suggest that no significant effect arises on INVALSI scores, neither for the pool of PON projects nor for specific tenders.

Keywords: school spending, test-scores, cohesion, RDD

A counterfactual approach to the evaluation of school policies: methods and models of analysis

Andrea Bendinelli - Michele Cardone

The fight against early school leaving in all its forms, the prevention of educational and school failure, the raising of basic competence levels and the support for lifelong learning are certainly among the main objectives of the interventions financed through PON projects in favour of schools. Following the agreement between INVALSI and the Ministry of Education (MI) - aimed at quantifying the effect of PON interventions aimed at (i) improving school performance and (ii) reducing early school leaving (implicit and explicit) through the construction of an analytical system anchored longitudinally and counterfactual capable of evaluating the progression and/or changes in students' skills over time in three areas: Italian, Mathematics and English. This assessment is carried out in a comparative perspective of the interventions on the learning levels achieved between the schools involved in the PON projects (hereinafter referred to as "cases treated") compared to those not involved in the PON planning (hereinafter referred to as "untreated cases"). For an easier reading of this document, we propose below a short list of the terms presented in this section and which will occur in the following sections. • Student: Case in the data matrix uniquely identified through the SIDI code. • Student: Student who has participated in one or more activities financed through the PON Project. • Case treated: Student who has participated in at least one of the PON activities. • Case not covered: Student who did not participate in any PON activity. • Counterfactual analysis: Statistical method, used both in (almost-) experimental situations and in not-experimental situations (Agodini & Dynarski, 2004; Berk, 2005; O'Dwye, 2018), aimed at calculating the effect of a treatment on a outcome variable (in our case, the

academic performance of students in Italian, Mathematics and English) by comparing the level of competence - in the aforementioned subjects - reached by the students who received the treatment (i.e. who participated in at least one PON activity) and the level of skills that these students would have reached if they had not participated in PON activities (for an in-depth analysis of counterfactual thinking, see Bennett, 1987; Roese, 1997). We define time t-1 as that relating to the phase preceding the administration of the treatment (that is, in our case, the INVALSI survey of Italian, Mathematics and English before the students took part in the PON activities). We define time t+1 as the time following the administration of the treatment (in our case, the administration of INVALSI test of Italian, Mathematics and English, after the students' participation in the PON activities). In the counterfactual analysis, reference is made to three groups: (i) control group, (ii) factual group, and (iii) counterfactual group. The control group is composed of students who have not received the treatment (i.e. they have not participated in PON activities) and who have characteristics (socio-demographic, such as gender, age, geographical location, citizenship, socioeconomic and cultural background of the family of origin ; and scholastic, for example, level of competence in the three subjects and regularity with respect to the course of study) completely similar to the characteristics of the students who received the treatment, and who make up the factual group. Finally, the counterfactual group is the one for which it is estimated what would have been the variation, from time t-1 to time t+1, of the students' competence in the factual group if they had not received the treatment. In summary. The counterfactual analysis is aimed at constructing, based on available data, the counterfactual situation - which in reality does not exist - to compare it with the factual situation (which is created following the administration of a treatment). It is therefore a technique that makes it possible to compare a real situation with a fictitious situation, statistically estimated based on available data, which can then be used to evaluate the effectiveness of interventions (educational, public policy, etc.) (Gordon & Todorova, 2019; Martini, 2006). The purpose of the evaluation of the effects is to verify the ability of an intervention to modify the behaviours or conditions of a specific target population in the desired direction. In the present case, it is a question of verifying whether the introduction of courses activated with PON funds has changed, in the desired direction, the skills of students measured by INVALSI tests. The effect is defined as the difference between what is observed after the use of the PON course or courses (factual situation) and what would have happened if this intervention had not been carried out (counterfactual situation). The variable on which to measure the effect of PON activities (outcome variable) was first defined: the score on INVALSI test of Italian, Mathematics and English. In line with the counterfactual methodology, a treatment group (made up of the students who took part in the PON activities) and a control group (made up of the students who did not take part in the PON activities) were defined2. The method used, the difference-in-difference (Angrist & Pischke, 2009; Keele, 2020), allows to estimate the average level of competence (in Italian, Mathematics, English) of those who could have attended the PON courses in the case which they had not done. The net effect of the courses is therefore obtained as the difference between the score observed on the "treated" students and the score that would have been observed in the absence of the treatment. To estimate the effect of the activation of the courses on the results of the standardized tests, a almost-experimental evaluation design was adopted. It should be noted that, in a 'pure' experimental context, i.e. in the event that the groups of students who participated in the PON activities and those who did not participate had been randomly assigned to the classes, it would have been possible to measure the effect net by making a simple subtraction between the means of the variable outcome (ie the students' skills in Italian, Mathematics, English measured by INVALSI tests) relating to the two groups. But since the area in question is not experimental, i.e. it is not possible to assume that the treated group and the control group are identical in relation to observable characteristics, much less in relation to non-undetectable characteristics, it is not possible to measure the impact of courses simply by subtracting the measured values in each group. Instead, it will be necessary to calculate this difference by also considering the differences observed between the two groups through control variables that identify the characteristics of the pupils. Control groups were then created for each cohort and for each discipline through a deterministic statistical matching procedure (Martini & Strada, 2011) using the statistical software SPSS version 27. The control group was built on the basis of socio-demographic and socio-economic-cultural characteristics of the students, i.e. the province in which the school is located, the ESCS (the socio-economic-cultural background index), the gender, the origin, the possible regularity with respect to the course of study and the starting score before the introduction of the treatment. This work will illustrate a methodological-computational point of view the construction phases and the steps taken to calculate the average effect of the treatment on the students treated (ATT) by comparing dedicated statistical models.

Keywords: counterfactual analysis, linear regression, statistical matching

THEME 6. STUDENTS: CHARACTERISTICS AND PECULIARITIES
THEME 12. LEARNING ENVIRONMENTS AND STUDENT OUTCOMES

ORGANIZER: INVALSI

COORDINATOR: PAOLO BARABANTI

OCTOBER 27TH: 4.30 P.M. – 6.30 P.M. {ROOM 3 LUDOVICA – RESEARCH 5}

Measuring and Explaining School Performance: Evidence on School Value-Added Models

Mara Soncin - Tommaso Agasisti - Chiara Masci

School performance estimates have been largely used as a tool to increase school accountability worldwide. Especially in the Anglo-Saxon context, there is a long-lasting tradition of measuring and using school value-added for high-stakes reasons (Sass, 2008) or to support school choice (Allen & Burgess, 2011). Despite the wide adoption, the issue of the stability of school performances, as well as the definition of the most precise methodological approach is still debated (see Schiltz et al., 2018; Agasisti & Minaya, 2019). Moreover, depending on the set of variables included in the model, gross versus net school effects can be assessed. The current research exploits the administrative datasets provided by INVALSI on lower secondary schools in Italy. In this respect, school value-added is defined as the difference between the test performance of a student in a school and the average performance of schools populated by students with similar (observable) characteristics. The availability of a broad set of individual, class and school-level characteristics makes possible to sort out the impact of other factors and to focus on the school value-added between the primary school (grades 2 and 5) and the last year of lower secondary school (grade 8). As a first step, the use of multilevel models allows to identify the portion of variation associated to each level of analysis and to assess school effects. Moreover, the possibility to link INVALSI data to a rich set of information coming from the Ministry of Education about school funding, teachers' characteristics and parents' involvement represents a novelty of the study and gives the possibility to explain, as a second step, the variability of school effects for the cohort 2018/19. In so doing, the paper contributes to the stream of literature on school performance measurement and provides evidence that can support the use of school value-added measures for policy reasons. The paper specifically contributes to the discussion on school value-added related to the set of covariates to be included in the model, which in turn influences how school value-added should be conceptually defined and interpreted. Everson (2017) underlines that there is nearly no consensus on this methodological choice. Most of the researchers agree on the fact that the larger the set of covariates, the lower the risk that missing covariates significantly bias estimates. At the same time, the inclusion of too many covariates could lead to an impoverishment of the value-added concept, which somehow refers to elements moved by each school to improve its performance. If too many variables are controlled for in the empirical models, the remaining value-added estimate risks being a synthesis of unobservable factors that hardly measure the specific choices made by schools for influencing their academic results. The possibility to link the rich INVALSI dataset on student and school background and the information by the Ministry of Education of school funding, teachers and parents offers a novel possibility to disentangle what should be included in the model estimating school value-added and in the model that explains the school value-added. Despite the relevance of the topic, this an under-investigated issue that the current research wants to tackle.

Keywords: value added, school effect, performance evaluation

Students' growth and future performances: evidence to support the development of early warning systems in primary schools

Melisa Diaz Lema - Tommaso Agasisti - Chiara Masci - Mara Soncin

Longitudinal studies examining students' progress have reported that students who are initially non-proficient in math or reading have a lower probability of becoming highly proficient in subsequent years than their counterparts, and thus report a larger probability to become at-risk students (Yi et al., 2021). Early detection of at-risk students, along with the identification of recurring personal, class, or school characteristics that can support them to increase their level of proficiency over time is a matter of primary policy interest (Heppen & Therriault, 2008). This study examines to what extent the longitudinal change in the academic achievement of elementary school students, between the second year and the last year of primary school (grades 2 and 5) explains the performances of the same students during the last year of lower secondary school (grade 8). Data used for the empirical analysis have been provided by INVALSI,

which yearly assesses through standardised tests the Italian student population in reading and mathematics at given grades. The longitudinal changes are measured across the school years 2012/13 (grade 2), 2015/16 (grade 5), and 2018/19 (grade 8). Supporting academic achievement requires thoughtful consideration of how best to track student growth and how to accurately assess student learning (Dweck, 2015). In this regard, the first part of the study identifies the students' characteristics, as well as the class and school factors, that affect students' proficiency development during primary school, with a particular focus on the longitudinal transitions from non-proficiency to proficiency students and vice-versa, pointing out the factors that differentiated the students who made progress toward proficiency from those who did not. Tracking student progress and assessing achievement growth over time is a critical feature of the instructional feedback loop as it provides evidence about the development of academic achievement that may be used to evaluate and polish current policy and practice (Shanley, 2016). The second part of the study investigates the effect that such passage has on students' performances in the last year of lower secondary school. The availability of a broad set of individual, class, and school-level characteristics makes it possible to sort out the impact of other determinants and to focus on the influence of proficiency development during primary school on future performances. To measure the covariates affecting the longitudinal changes, the study uses a particular case of a multinomial regression that implements Markov chain Monte Carlo routines for fitting multi-response generalized linear mixed models (Hadfield, 2010). While for the prediction of future performances, the study compares multilevel mixed effect models, nested at different levels, and machine learning techniques. In this second part, models are evaluated in terms of goodness of fit and in terms of goodness of prevision. The contribution of the paper is twofold. First, it models academic growth in the middle grades while supporting the identification of personal and school-related characteristics of students who need assistance at an early stage. Second, it adds to the conceptual debate about the importance of developing an early warning system for identifying and supporting students with potential future academic difficulties. Finally, policy implications about factors explaining student proficiency over time are provided, supporting educators and policy-makers with the means to intervene promptly. Keywords: Students' growth, early warning systems, at-risk students.

Keywords: students' growth, early warning systems, risk

Gender gap and STEM degrees: a climbing road for girls

Patrizia Giannantoni - Patrizia Falzetti

Contextual Framework. STEM degree programs are related to engineering, geo-biology, architecture, science and chemical-pharmaceutical disciplines. STEM graduates in 2017 make up 26.5% of graduates for the whole year (about 276 thousand). The data show a different composition by gender: among STEM graduates the male component is higher, reaching 59%, of students while among non-STEM graduates women prevail (they are almost two out of three) (source: Almalaurea). Focusing attention on the choice of the university discipline orientation is fundamental because it represents the base for the study of differences observed in the employment rates of graduates by subject area. In 2019, the employment rate of the graduate population reaches the highest level for the medical and pharmaceutical area (86.8%), followed by degrees in science and technology, (STEM, 83.6%), those of the socio-economic and legal area degrees (81.2%) and finally the degrees of the humanistic and services area (76.7%) (source: ISTAT). In addition, the gender gap in employment returns is clearly against women, and remains high even among graduates in technical-scientific disciplines (STEM) and even for courses with greater employability among STEM ones; such as engineering and architecture. In general, a large literature questions why there is an imbalance in the distribution by gender among scientific faculties and even earlier a disparity in the performance of girls in mathematics compared to boys, trying to investigate whether the differences depend on cognitive factors or more on social influences, such as stereotypes regarding STEM as a "male discipline". Some questions of interest are: do the mathematical skills achieved in high school count in a different way for the university choices of boys and girls? With the same mathematical skills, how important are context factors, such as the socio-economic background of the family of origin, and / or the evaluation by the teachers, the country of origin in favoring the choice of girls towards a STEM faculty? Once inserted in the

STEM University courses, do the girls have an equal performance with their male colleagues or even higher? Data. An original dataset was created ad hoc for this research project through the combination of different data sources: MIUR (Ministry of Education, research and Univerity), ISTAT and data. This combined data-source will allow us to follow different cohorts of students in a longitudinal perspective that covers different school grades and is eventually linked to university enrollments, as well as enrollments in the years following the first and to the number of educational credits obtained for each year of university course. It will therefore be possible to have data about students' performance, in all subjects (Italian, mathematics and English) and throughout the whole school career, as well as to have information about the student's family background (e.g. parents' educational level, socio-economic status of the family, country of origin, language spoken at home). We will also use information relating to the geographic location of the school from INVALSI data source. Furthermore, data will be available at the University level relating to enrollments, broken down by degree theology. By classifying the disciplines in a binary way (STEM / non-STEM) we will obtain the key variable for both descriptive and inferential analyses. Methods. Analyses about the profile of the girls who choose the scientific disciplines will be descriptive and factorial, trying to use multiple correspondence analysis techniques, to highlight how personal and contextual characteristics are associated with each other. On the other hand, inferential analyses will be carry on based on t logistic models to allow the estimation of the weight of the various factors in determining the choice (yes / no) of a STEM degree. In particular, the impact of the available variables will be estimated, keeping as a key variable that of "mathematics skills" measured as a categorical variable based on the WLE score levels (ordinal scale from 1 to 5) to INVALSI test of level 13, last year of secondary school. This variable will be accompanied by information relating to the student and her family both as independent variables and by estimating their impact in interaction with gender. After a first phase of descriptive analysis about gender differences in academic performance and university choices, we aim with this contribution to analyze in more depth the profile of the girls choosing STEM degrees, in terms of mathematical skills, social aspects. and self-confidence. Furthermore, through the use of regression models, the impact of various factors, individual and contextual, on the university orientation to STEM disciplines will be assessed. Particularly, we intend to estimate the weight of the mathematical skills, which we assume have an expected and legitimate influence on the choice of academic orientation, compared to to the weight of the "social" factors that instead lower the propensity of girls towards the more scientific-technological university paths. First results show that math skills are a strong predictor of choosing STEM degree (students with very high mathematics performance, i.e. Level 5, during the last year of high school are 5 times more likely to enroll in a STEM-university degree compared to students who have only reached the lowest level at INVALSI test, Level1. This link, however, does not explain the gender differences in the orientation to STEM university disciplines, which remain in a 1:2 ratio between girls and boys within each range of mathematics competence (Level 1 - Level 5). On the contrary, the geographical area where the school is located seem toplay a minor role in the choice of STEM paths in general, and also on the different propensities between females and males in the same choice. It is therefore essential to deepen how, on a personal level, trust in one's own skills undoubtedly has a strong impact with the same skills in the choice even towards non “common” paths.

Keywords: inequalities, gender gap, math, STEM, self confidence

Analysis of students’ performances using joint distribution of response accuracy and response time: an application to the INVALSI data

Stefania Mignani - Luca Bungaro - Marta Desimoni - Mariagiulia Matteucci

In recent years, the implementation of computer based testing (CBT) has been receiving a growing interest because of its operational advantages. CBT allows to automatically collect data not only on the students’ response accuracy (RA) based on item responses, but also on their response times (RT). Using the RTs, the assessment results can be further improved in terms of precision, fairness, and minimizing costs. The information obtained by RTs can be used for item calibration, test design, detection of cheating, and adaptive item selection (Van der Linden, 2007). The RTs used to respond to items provide information about working speed, where RA data provide information about ability. RTs are collected for estimating speed and item time-intensity (i.e., population-average amount of time needed to complete an item), to investigate relationships with speed components and accuracy, but also to investigate several issues in

educational testing (Klein Entik et al., 2009). In Italy, INVALSI every year administers standardized tests via CBT to students attending grades 8, 10, and 13. In this study, we aim at estimating the ability and speed of grade 10 students sitting INVALSI mathematics test in 2018, and evaluating the impact of some students' and learning environments' characteristics both to the performance and to the response time behaviour. Data We analysed RT and RA data collected by INVALSI in the 2018 National Assessment of mathematics achievements. In particular, we focused on data collected on grade 10 students. In the INVALSI assessment the number of involved examinees is very large and tests must be administered in multiple sessions. Therefore, for grade 10, multiple test forms were constructed by INVALSI from a Rasch item bank. The final dataset used in the present study included around 36000 students and 143 items. Socio-demographic variables and students' responses to a mathematics-test anxiety scale collected by INVALSI through a questionnaire were also considered. Method In order to estimate the accuracy and speed of students, we followed the approach of Fox et al. (2021), who implemented in the R package LNIRT the models of Van der Linden (2007) and Klein Entik et al. (2009). In particular, once the data on RA, i.e. correct/incorrect response, and RTs are collected for each item, they are modelled following a Bayesian joint model with a hierarchical structure that, at the first level, defines separate models for responses and response times. At the second level, a distributional structure is defined for the model parameters and hyperprior distributions are specified for the parameters. Lately, predictors of students' speed and ability were investigated through bivariate multilevel modelling (MLM), which explicitly recognizes potential correlations between the outcomes and the hierarchical data structure. Following Rasbash et al. (2017), bivariate MMs were specified by treating the individual student as a level 2 unit (n = 35,727) and the within-student measurements (Ability and Speed) as level 1 units. Students (n = 243) with missing values in the covariates have been excluded from the MLMs data. In the INVALSI database, students are clustered into classes, which were specified in the MLMs as level 3 units (n = 2,273). As regards the joint modelling of RA and RTs, the ability follows a normal distribution, while the speed distribution curve is slightly skewed. The correlations for person and item parameters allow us to say that there is, on average, a positive relationship between the difficulty of the items and their intensity and discriminating power, in terms of time. This means that the most difficult (easy) items are also the ones that discriminate better (worse) and require more (less) time to perform. The negative correlation between time-discrimination and time-intensity, on the other hand, indicates that on average the items that require more (less) time are the ones that discriminate worse (better), but with a very low and not significant magnitude. The correlation between the speed and ability (-0.574), is negative and significant and so, test-takers with a higher (lower) ability tends to be slower (faster). As for the MLM results, ceteris paribus, students with low prior achievement are less accurate and spend less time on mathematics items than their peers. A similar pattern of results emerged for the fixed effect of being a student who repeated one or more grades. As for gender, the unique associations with speed and ability are both positive and very similar in size: males are slightly more accurate and work slightly faster than females. Native students outperform students with an immigrant background in ability, and first-generation immigrants work slightly, albeit significantly, slower than the natives. Significant associations also emerged for students' self-reported mathematics test anxiety. Significant effects for some class compositional variables, school track, and geographical area also emerged. The various results in this study need to be confirmed through additional research. Some further developments should also focus on the opportunity to include response information in the detection of aberrant response behaviour.

Keywords: CBT, response time, multilevel, mathematics performance

THEME 1. EARLY SCHOOL LEAVING BETWEEN ANALYSIS OF THE PHENOMENON AND PROJECTS AIMED AT COUNTERING IT

ORGANIZER: INVALSI - ESPANET ITALIA

COORDINATOR: EMMANUELE PAVOLINI

OCTOBER 28TH: 9.30 A.M. – 11.30 A.M. {ROOM 1 ANNAMARIA – RESEARCH 6}

Short-term effects of an education savings program to tackle school dropout

Davide Azzolini - Loris Vergolini

Are education savings programs an effective response to the risk of school dropout in low-to-middle income groups? The paper reports and discusses the preliminary results of an experimental evaluation of an incentivized savings program aimed at supporting the educational expenses of children of low/middle-income families-and ultimately countering school dropout-during secondary school. The program under consideration, WILL "Educare al Futuro," is being implemented starting in 2019 in four Italian regions (Piedmont, Tuscany, Abruzzo and Sardinia) as part of an experiment supported by "Con i Bambini" and four other Italian foundations. Since the pioneering work of Sherraden (1991), a new idea of social policy based on asset building, i.e., support for asset building, rather than mere income transfers, has become increasingly popular. In their practical applications, programs inspired by asset (or wealth) building logic-and known as Individual Development Accounts (IDA)-offer low- or middle-income households support for the accumulation, through savings, of financial wealth. Typically, IDA recipients deposit small savings into a dedicated account for shorter or longer periods of time and receive an amount multiplied by a factor that varies from program to program on the condition that the amount of money is spent on one of the program's intended purposes. In an effort to interrupt the intergenerational transmission of poverty, participants are only allowed to use the accumulated wealth to purchase assets deemed to be wealth-generating, such as

post-secondary education and training, the purchase of a first home, or starting entrepreneurial activities (McKernan & Sherraden, 2008). IDAs-which have been joined over the years by programs explicitly targeted at children and known as Children's Savings Accounts (CSAs) or Child Development Accounts (CDAs)-are widespread in some countries such as the United States, Singapore, Israel, and Canada (Loke & Sherraden, 2009; Leckie et al., 2010; Beverly et al., 2013; Wang et al., 2018; Grinstein-Weiss et al., 2019), but are almost unknown in Europe. The only exceptions are two Italian programs-WILL (Azzolini & Vergolini, 2020) and Percorsi (Martini et al., 2021). The program evaluated in this study (WILL) targets first-year students of lower secondary schools from low-income families and offers them the opportunity to save small amounts of money (6 euros per week up to a maximum of 1,000 euros over a 4-year period) in a digital wallet. Household deposits are multiplied by four if the money is spent on proven educational expenses (e.g., computers/internet; culture, book purchases; various school expenses, language or computer courses, sports, transportation). In addition to the savings account, beneficiaries are offered a financial education program, educational support and guidance. Asset-building theory (Beverly et al., 2013) suggests that education incentive savings programs exert their effects through two main channels. The first is the financial channel, which takes the form of reduced education costs due to the savings supplements provided by the program and increased household financial preparedness and planning ability due to the savings habit. The second is the expectations channel, which hypothesizes that increased certainty about the real financial sustainability of education investments increases families' aspirations and expectations and their self-efficacy about the concrete possibilities of achieving educational goals in the medium to long term. Asset building theory also predicts that increased expectations can be translated into concretely observable and consequential behaviors, such as increased parental involvement in their children's schooling, and intermediate school-level outcomes, such as grades and school participation. The data used to produce the estimates of program effects presented in this paper come from the first follow-up survey conducted in the spring of 2021 (about 20 months after entering the program, that is, during the second year of secondary school). In the baseline sample (576 students including 293 treated and 283 control), the overall response rate was 78.6 percent with a differential attrition of 4.56 percentage points. The data contained the following intermediate school outcomes predictive of the primary outcome (graduation): grades, perceived learning, absences, disciplinary measures, and regularity of schooling. The pandemic context has led to consideration of additional aspects such as children's computer equipment and how they participate in integrated digital education. Subsequent data collections are planned for fall 2023 and spring 2025. The research also leverages administrative data from the program in order to study the saving and spending behaviors of beneficiary households. In addition, qualitative data collected from the implementation accounts and reports of individual area operators are used to monitor the utilization of the other interventions proposed under the program-educational accompaniment, school guidance, and financial education. Method The strategy of identifying program effects exploits the random assignment of subjects to the treatment and control group obtained by randomization. More specifically, we estimate the effect of treatment supply (Intention-to-Treat, ITT) by linear regression models that include fixed effects of randomization strata. Additional models also include a list of covariates (family ISEE, school grades in Italian and mathematics, gender, year of birth, and household size) in order to increase the precision of the estimates. We also estimate the effect of having actually received the treatment (Local Average Treatment Effect, LATE) through two-stage models, in which randomization is used as an instrumental variable of actual treatment receipt. For exploratory purposes, we also conduct heterogeneity analyses, that is, analyses designed to estimate whether the treatment had differential effects among groups of students. Specifically, we consider family ISEE, migration background, and parental education level. Administrative data from the program indicate that, in the first two years of the intervention, beneficiary families saved regularly (on average, 5.2 euros per week, totaling 403 euros on average) and used the resources made available for the intended educational purposes (spending an average of 1,450 euros since the program began). Analysis of the effects indicates, then, that the program has had a positive impact on family savings (for their children's education) and that this increased family savings for their children has not come at the expense of the families' own ability to meet subsistence expenses (e.g., alimony, rent, medical expenses, etc.). These are noteworthy findings since it is not a given that low-to-middle income families manage to save regularly, moreover during an economic crisis such as the one induced by the COVID-19 pandemic. However, the data also show that households with lower ISEE income show markedly lower levels of saving and spending than households with higher ISEE. This brings to attention the need to establish targeted support or supplementation mechanisms for lower-income households. The analysis also highlighted that, following the outbreak of the COVID-19 pandemic, there has been a massive reorientation of expenditures

from more classic items such as "books" and "sports activities" to "new technologies" (PC/tablet or internet connections), which have become essential for distance education attendance. The increased savings and additions provided by the program had substantial effects on the computer equipment (i.e., greater likelihood of having a dedicated computer and better internet connections) that students were able to use to cope with distance education and, more generally, integrated digital education. These effects, however, would not seem to have translated into concrete improvements in students' objective (grades, absences) and subjective (perceptions of learning and motivation to study) performance. An effect seems to be found, however, on students' likelihood of being regularly enrolled in the second year of lower secondary school, but this result needs future confirmation. No impact is found on educational aspirations and expectations, let alone on parents' levels of involvement in their children's school processes. However, the results clearly show that, among families with lower ISEE, that is, families with lower educational aspirations and expectations for their children, the program had a strong positive effect, raising by a substantial extent parents' desire and concrete belief that their son/daughter will successfully complete secondary school. This result should be further tested in the subsequent phases of the project in order to understand whether the higher aspirations and expectations will be transformed into consistent behaviors and better school outcomes.

Keywords: school, dropout, savings, public policy, evaluation

A predictive model of school failure

Michele Marsili - Patrizia Falzetti

School failure is often understood only as early school leaving (ESL), in fact it means the student who leaves school during the year and then is outside the education system in the following years. A further aspect of school failure, however, is that is related to low performances in some of the basic skills, Italian language (reading comprehension) and Mathematics mainly, but also in English. We also have seen, over the years, emerge another phenomenon, outlined through INVALSI data, which is the implicit dispersion. By definition, the students part of this phenomenon are those who, even if they obtain a high school diploma, do not have the appropriate skills to deal easily with adult life, in short, those who leave high secondary school with the basic skills provided at the end of low secondary school. Unfortunately, data, although slightly improving, tell us that at the end of high secondary school this phenomenon stands at around just under 10%, a considerable number of students, therefore, obtain the diploma without reaching the basic levels provided by the National Indications in all the subjects investigated, Italian language (reading comprehension), Mathematics and English (Listening and Reading). The present work aims to create a model that allows to well identify in advance the so-called "at risk" students, i.e. those students on whom the school, through the work of teachers and school leaders, can intervene in order to reverse the forecast of school failure. A statistical model of this type allows to identify, with a reasonable margin of error, the students who may fall into one of those categories at risk, namely abandonment, implicit dispersion or low performer. We intend to analyze the phenomenon from different aspects, also from a geographical point of view, to understand if there are areas more at risk, but the final goal is certainly to attribute a probability of risk for each student and provide a disaggregated and aggregated indicator to schools to allow them to intervene. Preventing school failure at this point would be "possible", or at least there would be the premises to start doing so. It could be done, for example, for students who enter a school cycle, the lower secondary school (the first class, grade 6) or the secondary school (the first class, grade 9), and make available to teachers a measure that identifies the students most at risk and the subjects in which they are most in difficulty so that they can intervene at the beginning of the school year on the student without wasting additional time; thus giving the student himself, for example, the opportunity to catch up, to recover the gaps accumulated in previous years. The data used in this work are INVALSI data of 3 cohorts, the one outgoing in 2019, 2021 and 2022; since these are outgoing students from grade 13 and the students' entire career is considered backwards, the data on absences from the Ministry of Education has also been added. All the datasets have been harmonized and queued in order to create a single database useful for preparing the model. For each student, the previous scores and all the information of family background, geographical

and school context available over time were retrieved in order to have a dataset as complete as possible. The various cohorts are distinguished through the year variable. In this work we propose an approach based on a supervised machine learning algorithm to identify students at risk of school failure. Machine learning is an application of artificial intelligence (AI) that provides systems the ability to automatically learn and improve from experience without being explicitly programmed. Machine learning focuses on the development of computer programs that can access data and use it to learn for themselves. Supervised learning is a subcategory of machine learning where Input variables (X) and an output variable (Y) are known and an algorithm is used to learn the mapping function from the input to the output. This mapping function is used to predict the output variables (Y) given new input data (X). In particular, a Random Forest model was used, one of the most widely used algorithms for classification tasks. The goal of using a Random Forest algorithm is to create a training model that can predict the target variable by learning simple decision rules inferred from prior data. Using the data of the three cohorts to train the model it is possible, given a new dataset, to make predictions and thus be able to identify students at risk. The variables used concern both the context data of the students and the results in the National Surveys in previous years. The assessment of the importance of these variables in the classification provides further indications on what are the potential causes of school failure. The results show that the algorithm is able to predict with a good level of accuracy students at risk of school failure. The analysis of classification performance metrics should be considered thoroughly before predicting potential cases of abandonment and a possible design of mechanisms for improvement interventions. The analysis of the importance of the most influential variables for the classification shows that the school performance in the previous surveys makes the greatest contribution to the forecast. This study is of great interest as it allows for predicting the possible dropout or low performance of a student and being able to take corrective actions both at a global and individual level.

Keywords: learning analytics, dispersion, abandonment, forecasting, machine learning

Measuring early school leaving at a sub-regional territorial detail: working hypotheses

Massimo Armenise - Barbara Baldazzi

Reducing early school leaving is one of the European Union (EU) priorities. In fact, this phenomenon generates serious repercussions on young people and society in general: greater difficulty in finding a job, limited employment prospects, lower participation in social, political and cultural activities; increased risk of poverty and poor health (ISTAT, 2020). School dropout, in fact, is an obstacle to economic growth and employment, holding back productivity and economic competitiveness and fueling poverty and social exclusion. In a country such as Italy, which is characterized by a significant demographic decline (ISTAT, 2021) and a slow labor productivity dynamic (Bank of Italy, 2021), even more evident if compared with other European countries, to loss human capital, as a result of dropping out of school, is even more likely to widen social divergences and undermine territorial economic cohesion. Moreover, the particular geographical concentration of the phenomenon, that is evident through Istat's data on early school-leaving in some regions, risks further undermining territorial cohesion, jeopardizing any possibility of possible future economic convergence. According to Italian national Institute of statistics (ISTAT), in Italy, the percentage of young people between the ages of eighteen and twentyfour who early leavers education and training turns out to be 12.7 percent (year 2021). Despite the considerable progress the country has made on this phenomen, this share remains among the highest of European Union countries, lower only than that of Spain and Romania (with percentages of 13.3 and 15.3, respectively), well above the targets set in the Community framework (Council Resolution on a strategic framework for European cooperation in education and training towards a European area of education and beyond (2021-2030) (2021/C 66/01). Moreover, one of the usual characteristics of our country turns out to be that it has wide gaps within itself. Looking at Istat data at the regional level (NUTS - 2), one can see an imbalance between the South and the North - Center regions. In fact, at the top 5 places in the ranking we find the five largest regions in the South: in first place we find Sicily with an early school leaving rate of 21.2 percent, followed by Puglia and Campania (with 17.6 and 16.4 percent, respectively). These regions are above the national average (12.7

percent). On the other hand, however, regions as Abruzzo, Friuli-Venezia Giulia, Molise, Emilia Romagna and Marche are below the European Union target of 10 percent. The strong disparities in school dropout rates that emerge in certain geographical areas of the country could indicate specific structural problems, and if this evidence is combined with the need to implement policies aimed at mitigating territorial differences, it is therefore explained how relevant is the need to refine the level of territorial analysis as much as possible, so as to be able to distinguish and initiate specific measures for those territories and schools most affected by this phenomenon. The aim of this (preliminary) short paper is to elaborate a statistical indicator of early school leavers, capable of measuring this phenomen at an increasing and flexible statistical territorial detail. To try to quantify the phenomenon of early school leavers at the territorial level, open data from the national student registry (source Italian Minister of Education - MIUR) were used. The information from the open data registry of the Italian Minister of Education is currently available for the school years 2015/16, 2016/17, 2017/18, 2018/19, 2019/20, and 2020/21, and provides census information on: the number of students enrolled in each Italian school; student distribution by age and grade; the type of school; and the exact geographical location of the school. Through these data, it is possible to track fifthteen-year-old students present in Italian schools, up to the age of eighteen, in order to quantify how many of them, in the pre-COVID (school year 2018/19) and post-COVID period (school year 2021/22), stopped attending schools in a given territory. In this specific exercise, the early school leavers rate has been calculated at the provincial level and this territorial level allows emerging important spatial differences. But an important aspect of this indicator is that it could also be calculated at the municipal areas or at the any other territorial level obtained from the sum of the municipal areas, as for example Local Labor System or Internal areas or Functional Urban Area and so on). An overall territorial consistency seems to emerge from the preliminary results. The southern Italian provinces are characterized by higher early school leavers rates: twenty provinces have one students on five drops out of school early; this rate grows up in the Neaples and Caserta province where it is close to thirty percent; but among the worst provinces, some central northern territories (such as Prato, Piacenza, Florence, Livorno, Reggio nell'Emilia, and Imperia) also stand out. This last result also highlights how there is also a good deal of variability within the regions themselves, and how it is important to analyse this phenomen at a more detailed territitorial level. Another interesting result that would seem to surface is how in the "post" pandemic period the early school leavers rate (calculated through our indicator) has reduced almost everywhere. The preliminary analysis carried out thus makes it clear how the current scenario is prodromal to generating a new further widening in income disparities and to follow a non-development path in the near future, above all in those territories in which there will be a contemporary precence of a demographic contraction and a low instruction rate of the population.

Keywords: early school leavers, territorial inequalities

THEME 14. INTERNATIONAL LARGE-SCALE ASSESSMENTS (ILSAS) METHODS AND RESULTS

ORGANIZER: INVALSI

COORDINATOR: MARIA MAGDALENA ISAC

OCTOBER 28TH: 9.30 A.M. – 11.30 A.M. {ROOM 2 GIULIA – RESEARCH 7}

Identify effective teaching practices from TIMSS 2019 to address educational inequalities: a further analysis in Italy

Zhijun Chen - Andres Sandoval Hernández

Decades of studies have shown that high socioeconomic status (SES) students tend to have better performance than low SES students (Sirin, 2005; Lee, 2005; Entwisle, Alexander & Olson, 2010. OECD, 2020). One of the most effective strategies to eliminate the learning gap caused by socioeconomic status in the classrooms is to ensure equal access to learning opportunities through effective teaching practices (Darling-Hammond,1998; Hattie, 2010). Effective teaching practices refer to teaching strategies used in the classroom that reliably and consistently increase student learning (Wray et al., 2000). The research on Teaching Effectiveness addresses this topic from two main perspectives. The first one states that effective teaching should be equally delivered to students independently of their social background, while the second considers that effective teaching should explicitly focus on reducing the effect of the family's socioeconomic background on academic outcomes (Aditomo, 2020). International studies like the OECD Programme for International Student Assessment (PISA) have data available to test hypotheses based on both perspectives (Hwang et al., 2018). Another aspect to consider is that today's students spend more time looking at screens than talking to each other (Tamana et al., 2019). They read and write more than any past generation, yet the bulk of their written communication is on social media (Griffin, 2015). Furthermore, the industries they will enter and the jobs they need preparation for are ever-changing. These factors suggest that there are elements to think that effective teaching practices should be changing too. However, not many studies model the possible interactions between teacher factors and the socioeconomic background of students, particularly in internationally comparable studies (Baumert et al., 2010; Nilsen & Gustafsson, 2016). To fill in this research gap, one International Large-Scale Assessments (ILSAs), TIMSS, is used in this study to explore these issues across different educational systems. Moreover, given the consistency of the patterns found in the case of Italy, further analyses to investigate the differential effects for boys and girls in this country. The current study aims to investigate the relationship between 8th-grade students' mathematical achievement and their home, school, and country contexts using data from TIMSS 2019. This aim will be achieved by answering the following research questions: RQ1) What teaching practices are more consistently associated with student achievement (effective practices) across countries? RQ2) What teaching practices mediate the association between students' SES and their academic achievement (contextually effective practices)? RQ3) In what countries are these patterns more consistent? Are there differential effects for boys and girls in these countries? Data The data for this study comes from the TIMSS 2019. TIMSS 2019 is the seventh assessment cycle of TIMSS conducted by the International Association for the Evaluation of Educational Achievement (IEA). TIMSS is a large-scale assessment examining the mathematics and science achievements in the fourth and eighth grades in more than 60 countries. TIMSS 2019 also records student's demographics (e.g. socioeconomic status, gender, age,etc.,), backgrounds of their parents or caregivers, teacher characteristics (e.g., teaching experiences, teacher education, gender, etc.), and school characteristics(e.g., school resources, school discipline., etc.). Data preparation will be conducted using IDB-Analyzer and SPSS. The data will be analyzed using a multi-level approach nested with individual students at level 1 and class at level 2 using R. More specifically, the analytical strategy will be as follows: RQ1) To identify the teaching practices more consistently associated with student achievement, a set of multilevel models (Raudenbush & Bryk, 2002) are tested with student characteristics at level 1(i.e. gender, SES) and class characteristics(i.e. class-SES, instructional clarity, classroom organization, teacher education, teacher experience) at level 2. RQ2) To identify the teaching practices that are more effective at ameliorating the negative effects of SES on student achievement, the cross-level interaction effects of the teaching practices (identified as effective in RQ1) on the relationship between SES and student achievement (Mathieu et al, 2012) are tested based on the first set of models. RQ3) After the country/countries for further

analysis are selected (showing significant cross-level interactions in RQ2), each country is separated into two subsets based on gender. For both male and female groups, the cross-level interaction effects of the teaching practices on the impact of SES on student performance are tested. The findings provide insights to reduce learning gaps caused by SES differences across countries and also provide discussions of all possible routes for policymakers in different educational systems sharing similar patterns. Preliminary results suggest that high-quality teaching practices in the classroom help eliminate student achievement differences between low SES students and high SES students across a number of countries. The results of our models including cross-level interaction effects of the teaching practices on the impact of SES on student performance suggest that Italy is the only European country that shows a significant impact of 'classroom clarity' on the relationship between SES and student achievement. Further analyses showed that in the Italian educational system, 'good instructional clarity' delivered by the teacher in the class can help reduce the negative effect of students' SES on math achievement, especially for male students (while this is not the case for female students). This paper aims to contribute to current research on effective teaching practices in four main respects. First, by theorizing on the mechanisms underlying the relationship between learning outcomes, students' socioeconomic status, and their association with specific teaching practices. Second, by applying sophisticated statistical techniques to analyze a large body of educational data (the pooled dataset will contain ~2 million individual cases [students] in 100+ countries). Third, by providing concrete policy recommendations to address current educational inequalities through the identification of effective teaching practices and the mechanisms to implement them in secondary schools. Fourth, by selecting Italy and further analyzing the impact of teaching practices on SES and student achievement based on different genders, policies recommendations, and suggestions for schools can be extended to different genders in Italy's educational system.

Keywords: educational inequality, teaching practices, ILSA

Side effects of large-scale assessments in teacher assessment conceptions and practices

Serafina Pastore

On the backdrop of the recent educational data movement (Marsh et al. 2015; Schildkamp et al. 2019), teachers are expected to use different kind of data to inform their instructional decision-making. However, different studies have already demonstrated that teachers are reluctant to change their assessment practices (and conceptions), especially when new practices are framed within the rationale of institutional reforms (Boardman & Woodruf, 2004; Brown, 2004; Remesal, 2007; Klieger, 2016), or in new scenarios such as those that emerged during the COVID-19 pandemic. Despite the recognition of the importance of assessment, some studies (Hopfenbeck, 2015; Looney et al., 2018) have also identified the lack of modernisation and have indicated that assessment has not changed materially. More specifically, recent studies on the use of assessment data for decision-making and teaching practice have showed that although teachers recognise the importance of using evidence and data gathered through assessment, sometimes, they are not able to manage several sources of information including data from LSAs (Farrell & Marsh, 2016; Mandinach & Gummer, 2016; Schildkamp et al., 2014). While LSAs have been progressively recognised as relevant components of educational accountability systems, teachers' negative attitudes towards LSA programmes and the lack of assessment literacy have been highlighted (Klinger & Rogers, 2011; Fullan et al., 2018). In this perspective, research evidence (Hopster-den-Ottera et al., 2017; Schildkamp et al., 2019; Monterio et al., 2021) suggests that the identification of practical assessment challenges for teachers, as well as the understanding of teachers' conceptions of assessment are of paramount importance in order to ensure teacher assessment literacy, teacher professionalism, and effective school improvement. The present study, with a focus on the Italian school system, tries to offer new insights for this debate. Despite the increasing interest in researching teachers' assessment conceptions and in understanding how these conceptions affect the assessment literacy development, in Italy these research topics, unfortunately, are still neglected. Therefore, given the current lack of empirical studies on teachers' LSA conceptions an exploratory qualitative study has been realized (Stebbins, 2001; Strauss & Corbin, 2007; Creswell, 2014).

The study sought to better understand how Italian teachers conceptualise the LSA and how they use its results, addressing the following research questions: 1. What do teachers think of the INVALSI programme? 2. How do teachers use the INVALSI results for their instructional practice and decision-making (at classroom and school level)? The literature on teacher conceptions of assessment and teacher assessment literacy lays out the foundation for the framework adopted in this study. The present study was guided by the grounded theory interpretative method (Strauss & Corbin, 1998). This approach, functional to investigate, describe, and understand features of phenomena such as perceptions, beliefs, conceptions, feelings or judgments, has been helpful in exploring individual points of view of teachers and drawing unified explanation (Corbin & Strauss, 2007) of their "re"-actions to the national LSA programme in Italy. A total of 70 teachers from 5 schools in the district of XXXX (details removed to avoid identification) were selected to participate in the study. These schools have the same organization and jointly include grades 1°-5° (primary) and grades 6°-8° (middle). Only teachers of Italian and Mathematics were considered. Data - Data were collected through semi-structured interviews. Drawing on relevant theoretical and empirical literature to design questions about teachers' conceptions of the LSA programme, teachers' experience with INVALSI data, and their instructional responses to data, the semi-structured interview track comprised 10 questions divided in two main sections: 1. Assessment conceptions: Questions in this section sought information on the teachers' conceptions of LSA, its aims, and values; and 2. Data usage: This section aimed to analyse if, and how, teachers use large-scale data in their instructional practice and decision-making. Compared to data gathered by INVALSI through the Teacher Questionnaire, the results of this study show how the relationships among LSA, the teaching-learning process, and the Italian school system are ambiguous and incoherent. While LSA is perceived as disconnected from school and teaching practice, classroom-based assessments are considered not entirely reliable although they provide more information about student learning processes. The major hindrance is the teachers' conceptions of the LSA programme that is rarely used to refocus and improve teaching for individual students (Herman 2016). Even though national and international LSA programmes have largely spread across different countries (Verger et al. 2019), research evidence points how such assessments are sometimes perceived as a threat to the teachers' practice and professionalism (Emler et al., 2019). It is clear from this study that the use of LSA data for teachers' decision-making is lacking. The lack of significative differences among the teachers' conceptions (e.g., socio-demographic variables such as gender, age, and subject matter) contrasts with the complexity of the findings derived by previous research (Klinger & Rogers, 2011; Barnes et al., 2017; Brown & Remesal, 2017). The intrinsic limitation of an explanatory qualitative study must be mentioned. Another factor to consider is selection bias. In this study only Italian and Mathematics teachers have been considered because directly involved in the national LSA programme. Future research should explore factors that might account for the variability in teachers' conceptions of INVALSI programme. Factors to ponder include teacher demographics characteristics, differences across disciplines, differences in teacher training or professional development. However, this study presents a unique opportunity to share and compare challenges and highlights the need to address these challenges in order to review teacher education and professional development in the assessment domain. Future studies should strive to better understand teachers' conceptions at the school level in the context of school reform in Italy and to design more effective teachers' education and/or professional development paths towards assessment literacy.

Keywords: large-scale assessment, assessment literacy, teacher education

The Origins of Trust in Order and Representative Institutions among Adolescents across 15 European Countries

Linde Stals - Ziemes Johanna

Within the literature, a longstanding debate on the origins of political trust persists. Whereas institutional theories regard political trust as endogenous, rational judgments about current or past institutional performance (Wu & Wilkes, 2018); cultural approaches attach greater meaning to exogenous influences, indicating that trust dispositions are 'an emergent property' (Rose & Mishler, 2011, p. 34), shaped from early childhood on through experiences with a variety of socialization agents (Flanagan, 2013). In research

on adults, particularly the institutional framework has found wide support (Mishler & Rose, 2001). However, there is little knowledge about the relative importance of both approaches among adolescents, a group of emerging citizens (Ziemes et al., 2020) who, compared to adults, generally receive fewer opportunities to interact with and are less knowledgeable about their state's institutions and representatives. Studying the origins of adolescents' political trust might therefore generate unique insights about the relevance of rational and socialization influences on shaping political trust among individuals, who are still being 'molded' into democratic citizens (Mayne & Hakhverdian, 2017, p. 182). Furthermore, as recent research in adults and adolescents has shown that political trust is best represented as a two-dimensional construct, separating trust in order institutions (e.g., the police and the courts of justice) from trust in representative institutions (e.g., the parliament and political parties) (Breustedt, 2018), with each aspect relating differently to political behaviour (Stals et al., 2022), the question arises whether both types of political trust have divergent origins among adolescents as well. To address this research gap, the present study is guided by the following research question: what are the origins of trust in order and representative institutions among adolescents living in established democracies? Specifically, we will investigate the relevance of socialization influences at school (i.e., cultural perspective), as well as the student's level of civic proficiency (i.e., rational, institutional perspective). The main aim is to contribute to the literature on the development of political trust attitudes among adolescents across different European countries. First, we propose a theory-driven two-dimensional structure of political trust among youth (i.e., separating between order and representative institutions). Next, we intend to investigate endogenous and exogenous origins of trust in order and representative institutions among adolescents, using three theoretical frameworks: the theory of social capital, procedural fairness theory, and the critical citizen theory. The results will focus on the Italian context in a comparative perspective. This study draws on cross-sectional data from a representative sample of eight-grade students (14-year-old) across 15 European countries that participated in the International Civic and Citizenship Education Study (ICCS) 2016 (Schulz et al., 2018). To measure political trust, respondents were asked to what degree they trust the following seven institutions: the national parliament, political parties, the national government,, the police, the armed forces, and the courts of justice. The former three institutions are considered representative institutions; the latter three are considered order institutions. Items are rated on a four-point Likert scale ranging from "Not at all" (=1) to "Completely" (=4). Three covariates are included in the research. First, to measure students' social capital, students' perception of positive student relationships at school was assessed using three items: 'most students at my school treat each other with respect', 'most students at my school get along well with each other', and 'my school is a place where students feel safe'. Items are rated on a 4-point Likert scale, ranging from 'strongly disagree' (=1) to 'strongly agree' (=4). Based on Item Response Theory (IRT) scaling methodology (Köhler et al., 2018; Schulz et al., 2018), scores with an average set at 10 and standard deviation of 2 within each participating country were estimated. Higher values reflected more positive perceptions of interaction. Second, as a measure of procedural fairness perceptions, we used the ICCS scale 'perception of student-teacher relations at school', which is derived from five indicators: 'most of my teachers treat me fairly', 'students get along well with most teachers', 'most teachers are interested in students' wellbeing', 'most of my teachers really listen to what I have to say', and 'if I need extra help, I will receive it from my teachers'. Items are rated on a 4-point Likert scale, ranging from 'strongly disagree' (=1) to 'strongly agree' (=4). Based on IRT, scores were estimated for each student. These scores have an international average set at 50 and a standard deviation of 10. Higher values reflect higher fairness perceptions. Finally, as a defining characteristic of critical citizens (Norris, 1999; 2011), civic knowledge was assessed via a timed cognitive test. Students answered closed and open-ended questions concerning different democratic institutions, procedures and the civil society. Given the rotating booklet design (i.e., each student received only one subset of questions), five plausible values with an international average of 500 and a standard deviation of 100 were created for each student using IRT. All plausible values were used in the analysis. Data was recoded and merged using the IEA IDB analyser (IEA, 2017) and IBM SPSS (IBM Corp., 2021). All CFA and regression analyses were performed in Mplus 7.4 (Muthén & Muthén, 2017). The estimation considered the complex sample design (students nested within schools within countries) of the ICCS 2016 survey (Schulz et al., 2018). To account for the ordered-categorical nature of the data, model estimation was run with the weighted least squares mean and variance estimator (WLSMV) with theta parametrization. To handle missing data, the full information maximum likelihood (FIML) method was used, which uses all available information for any variable, excluding only cases with missing data on all variables. In a first step, we applied free alignment optimization (Asparouhov & Muthén, 2014; Byrne & Van de Vijver, 2017) to estimate factor mean estimates for each country. As the overall average of 16.11% non-

invariance is lower than the recommended 25% non-invariance threshold for determining the trustworthiness of latent mean estimates (Asparouhov & Muthén, 2014), we feel confident in the reliability of the factor mean estimates and their comparisons across the 15 studied countries. In a second step, multilevel multivariate regression analysis was applied to explain levels of political trust among adolescents. A step-wise modelling strategy was used. First, we estimated a model containing only background variables (i.e., gender, migration background and socio-economic status) (Model I). Next, the individual effects of positive student relationships (Model II), procedural fairness perceptions (Model III), and civic knowledge (Model IV) were analysed while controlling for background variables. All predictors were combined in a final comprehensive model (Model 5). In a final step, we investigated country variations in the effects of generalized trust, positive student relationships, procedural fairness perceptions, and civic knowledge on origins of trust in order and representative institutions by comparing the standardized effects across the studied countries. Multilevel multivariate regression analyses show that determinants of political trust are predominantly found at the individual-level. More specifically, positive relationships with peers (i.e., as measure of social capital), as well as feeling fairly treated by teachers (i.e., as measure of procedural fairness perceptions) are strong, positive predictors of both types of trust. On the other hand, students with higher levels of civic knowledge indicate higher levels of trust in order institutions, though lower levels of trust in representative institutions. Furthermore, whereas social capital and fair treatment perceptions affect adolescents across Europe in a similar (i.e., positive) way, the effect of civic knowledge, in line with critical citizenship theory, varies not only by type of trust but also by country characteristics. Looking at the Italian context, we find a positive association between civic knowledge and trust in order institutions though this fails to reach conventional levels of statistical significance. With regard to trust in representative institutions, a statistically significant negative association is found. This indicates that, all else equal, Italian students with higher levels of civic knowledge indicate lower levels of trust in representative institutions, yet similar levels of trust in order institutions as compared to their less knowledgeable peers. Further analysis aims to include contextual variables to explain the found country variations (e.g., human development index and the corruption index) with a specific focus on Italy.

Keywords: political, trust, political, socialization, ICCS 2016

Patterns of Missing Education Data for SDG 4

Daniel Shephard

The international community has now reached the mid-point of the Sustainable Development Goal and Education 2030 Agenda. However, notable patterns of missing education data persist despite commitments to enhancing data systems to inform decision-making, ensuring no one is left behind, and including all countries in the sustainable development goals. There is evidence of stagnating global education data reporting since 2015, with some evidence of worsening data availability at the global level. Furthermore, data gaps suggest certain types of learners remain systematically left out of data-systems, which can lead to their de-prioritization in decision-making. Finally, despite access to more sophisticated data infrastructure and more robust public funds, the global data availability for high-income countries, such as Italy, remains low compared to other countries. Drawing from UIS data and descriptive analysis developed as part of NORRAG's Missing Education Data project, this presentation presents evidence for these patterns of missing data types and groups and the implications for data use. The presentation further argues that the persistent gaps in the global education data infrastructure are patterned by the legacy frameworks that continue to restrict our vision of sustainable educational development to formal primary schooling in low- and middle-income countries. This legacy is manifest in missing education data that continue to neglect needs of learners during their early years, youth, and adulthood and those who live in higher-income countries. In addition to global patterns, the presentation shows how Italy illustrates these patterns.

Keywords: missing data, education, sdg 4

THEME 8. METHODS AND MODELS APPLICABLE TO SCHOOL SYSTEMS

ORGANIZER: INVALSI

COORDINATOR: LORENZO MARAVIGLIA

OCTOBER 28TH: 2.00 P.M. – 4.00 P.M. {ROOM 1 ANNAMARIA – RESEARCH 8}

Schools's performance and the role of principals' managerial practices

Anna Mergoni - Ana Camanho - Mara Soncin - Tommaso Agasisti

School principals play an important role for schools' performance and their actions have direct and indirect consequences on teachers practices, school quality and students' behaviours and outcomes (Dhuey and Smith, 2018; Agasisti et al., 2020; Aravena & Gonzalez, 2021). Based on the assumption that a greater autonomy of principals would allow to improve schools efficiency, many educational systems have increased the responsibilities and the tasks of school principals (Keddie et al., 2020). However, this autonomy is challenging and, if not properly planned, can lead to unintended consequences. On the one hand, the principals can enhance their positive contribution to the educational quality of the schools and their managerial ability can bear fruit in economic terms. On the other hand, since a proper training is often not provided, many principals remain unqualified and become progressively inadequate from a managerial perspective, with negative consequences in terms of an equitable management of resources for the students (Keddie et al., 2020). This is even more relevant given the critical role the principals as school managers and leaders proved to have in affecting students' outputs (Louis et al., 2010). Investigating the impact of principals' managerial skills on schools' efficiency is challenging both from a methodological and an empirical perspective. Previous literature widely agrees on how to estimate the schools production function and efficiency (Witte & Lopez-Torres, 2017) but there are far less studies investigating the impact of the external variables on the efficiency (Mergoni & De Witte, 2022), and, to the best of authors' knowledge, no previous study illustrate explicitly how to assess the interactions among the external variables. Secondly, information about the principals and, in particular, about their managerial skills are not easy to retrieve. Indeed, the main international educational assessment (PISA, PIRLS, TIMSS) do not collect information about principals. A possible explanation for this is that the educational literature has often neglected the role of principals, focusing on other players, such as the parents and the teachers. Therefore, less attention has been paid on the collection of information about principals (Dhuey & Smith, 2018). Besides, managerial skills encompass a wide range of abilities that are often hard to define and measure. Given the contribution of principals to school efficiency and effectiveness, and the potential threat in case of unskilled principals, it is fundamental to point out the best managerial practices. The objective of this paper is to investigate what are the managerial abilities of the schools' principals that affect the most the schools' educational production function and efficiency and what are the interactions between these skills. In particular, we consider the schools production function in terms of standard educational outcomes (measured via test-scores), and involvement and positive attitudes of students, teachers and parents (measured via a questionnaire compiled by the principals). Pointing out the most relevant managerial areas allows the schools principals and the policy makers to target their efforts, their resources and the training, with the aim of promoting more efficient and effective education. Data To implement the analysis, we rely on the micro-data collected by INVALSI for the students in the 8th grade in the school-year 2018/19. We used information regarding students socio-economic background, test scores in math, italian and english. Also, we consider the principals questionnaire delivered to the national sample and from that we retrieve information regarding students' behaviour, teachers' behaviour, parents' behaviour and principals' managerial practices. Firstly, we evaluate schools' performance through a robust order-m and conditional order-m Data Envelopment Analysis (DEA) (Charnes et al., 1978; Cazals et al., 2002). This allows to account for the endogeneity of principal practice and for the heterogeneity in the school environment they might have to face. Secondly, we investigate how management affects the performance of the school, in terms of students' achievements and school climate, focusing in particular on the interaction effects between different managerial practices. Findings support the hypothesis that principals' managerial attitudes and actions are a key element to establish a positive learning environment.

We also found that that there are strong interactions among the principals' managerial skills and that the practice that can make the stronger difference are related with the activity of discussing with teachers, setting educational goals, and leadership.

Keywords: evaluation, principals, efficiency

How ready are Italian teachers for the challenge of digital innovation? A fuzzy approach for measuring digital readiness

Sergio Longobardi - Antonella D'Agostino - Giulio Ghellini - Laura Neri

The COVID-19 emergency has rapidly accelerated technology adoption at school, and this phenomenon will continue to evolve. Thus, teachers must be prepared for digital innovation (Pokhrel & Chhetri, 2021). The COVID-19 pandemic has provided us with an opportunity to pave the way for introducing digital learning (Dhawan, 2020). Still, there is a need to measure and quantify the readiness of teachers and schools to integrate technology into teaching successfully. Furthermore, the teacher's readiness to integrated digital teaching is not an easy concept to be measured because of its multidimensional nature. It depends on different dimensions representing several aspects of readiness and are measured by a set of observable elementary indicators. We show how the fuzzy approach to multidimensional poverty measurement (Betti et al., 2016) can be a helpful tool in this framework. Recognizing that different dimensions characterize the teacher's readiness to integrate digital teaching, the identification of "who is willing to digital innovation" becomes a more complicated task because the analysis is based on several elementary indicators, and it is difficult to choose a single threshold value below which teachers are classified as "not willing to digital innovation". Indeed, operationally, one should decide the cut-off value for each item, and this exercise could not be so immediate. In contrast, by avoiding a crisp approach, we consider teachers' readiness as a matter of degree (fuzzy concept) by specifying a membership function to the set of ready teachers (ranging from 0 to 1). We use a representative sample of teachers provided by INVALSI. Our empirical strategy investigates the dimensions that define the teacher's readiness to integrate digital teaching using a formative perspective (Maggino & Zumbo, 2012) and aim to answer the following research questions: do these dimensions differ by grade levels, subjects and regions? Do these dimensions influence students' attendance at on-line lessons? This exercise can be a valuable tool for Italian policymakers in the framework of the Digital Education Action Plan (2021-2027) to highlight and promote policies that will improve the introduction/integration of ICT tools in the school. We dispose of a set of single indicators that summarize four dimensions that measure different aspects of teachers' readiness. We apply a fuzzy approach to summarize each dimension d (d=1…4). We follow the methodology proposed by Betti et alter (2006) adapted to this framework. Accordingly, we summarize the information for each dimension d as follows: μ_d (i)=∑_k▒〖w_(d)k μ_j (x_ij)〗/∑_k▒w_(d)k (1) where μ_j (x_ij) is the membership function of item j that takes values between 0 (lowest level of the readiness to digital innovation) and 1 (highest level of the readiness to digital innovation) for the unit i; and w_((d)k) is a data-driven weighting system. To summarize the information for each subgroup s of analysis (s=grade levels, subjects and geographic area) and dimension, we compute an overall fuzzy index μ_d that is defined as the average value of individual values μ_d (i), as follows: μ_d=1/n_s ∑_(i=1)^(n_s)▒〖μ_d (i)〗 (2) where n_s is the sample size of subgroup s. We used multilevel logistic regressions to study the relationship between dimensions and the students' attendance at on-line lessons. 3. Data For this study, we use data administrated by the National Institute for the evaluation of the education and training system (INVALSI). We use the recent data (s.y. 2020/21) from the sample survey devoted to the teacher's opinions on various aspects of school life. The survey covers teachers engaged in three different subjects (Italian, Mathematics, and English), who provide instruction in programs at the ISCED 1 level (5th grade), at the ISCED 2 level (8th grade), and at the ISCED 3 level (13th grade). After the COVID-19 pandemic, the teacher questionnaire is more focused on the teacher use of ICT before and during the emergency period, as well as other helpful information concerning the availability of good ICT infrastructures at home and actions carried out by each school to facilitate and improve digital teacher skills. For the empirical analysis, we consider a total of 49 elementary indicators arranged in four dimensions using a measurement perspective based on formative indicators (Jarvis et al., 2003). The first

dimension (D1) measures "ICT expertise in education", the second dimension (D2) measures "Constraints linked to digital teaching", the third dimension (D3) measures "Actions to enhance propensity to ICT skills", the fourth dimension (D4) measures "School support to digital teaching activities". Furthermore, we consider the variable that measures the students' attendance at on-line lessons and some additional variables to be used as controls in the statistical model. Empirical bootstrap 95% confidence intervals for the differences have been estimated to test whether there is a significant difference for each overall index μd between subgroups in each dimension. When the interval includes zero, at a significance level of 0.05, we cannot reject the hypothesis of no difference between groups. Findings generally stress significant differences between grades, subjects, and macro-regions in several dimensions. Multilevel logistic regressions are used to analyze the relationship between teachers' readiness and the student's attendance at on-line lessons. The outcome variable is a binary indicator that takes the value 1 if more than 76% of the students have attended the on-line lessons and 0 if the attendance of the students is less than 76%. Multilevel logistic models were estimated considering among the covariates the average readiness index, an average of the 4 sub dimensions, (mod.1) or, alternatively, each of the single fuzzy dimensions (mod.2 - mod.5). In each model, we control for: the socio-economic status of the students' class (ESCS average), the average performance of students in each class (reading score), the geographic area (NUTS 1) of the school, the grade and a set of individual characteristics of the teacher. The main results show that the greater readiness of teachers seems to be linked to greater participation of students but, by focusing on single dimensions, dimensions 1 (ICT expertise in education) and 2 (Constraints linked to digital teaching) are significantly correlated while no significant relationship is observed with respect to dimensions 3 (Actions to enhance propensity to ICT skills) and dimension 4 (School support to digital teaching activities). Table1 Determinants of students' participation to on-line lessons: results from multilevel logistic models (odds ratios). Covariates Mod1 Mod2 Mod3 Mod4 Mod5 Avg_fuzz (avg of the fuzzy dimensions) 3.733*** D1 (ICT expertise in education) 1.690* D2 (Constraints linked to digital teaching) 3.679*** D3 (Actions to enhance propensity to ICT skills) 0.875 D4 (School support to digital teaching) 0.733 ESCS (class avg.) 1.444*** 1.439*** 1.423** 1.445*** 1.442*** Reading score (1.026*** 1.026*** 1.026*** 1.026*** 1.026*** Grade 8 (ref: grade 5) 1.022 1.018 1.004 1.021 1.021 Grade 13 (ref: grade 5) 1.159 1.157 1.073 1.139 1.137 Subject=English (ref: math) 0.785** 0.781** 0.794** 0.786** 0.787** Subject=Italian (ref: math) 0.866 0.868 0.903 0.880 0.884 Teacher with permanent contract 1.312* 1.315* 1.357* 1.354* 1.354* Gender=Male 1.008 1.021 0.989 1.010 1.013 Age (>60 years old) 0.731** 0.735** 0.712*** 0.726** 0.729** Years of service in the school (>4) 1.420*** 1.419*** 1.429*** 1.411*** 1.411*** Costant 2.810*** 2.841*** 2.877*** 2.833*** 2.864*** Geographic area controls Yes Yes Yes Yes Yes Schools 1,046 1,046 1,046 1,046 1,046 Students 4,814 4,814 4,814 4,814 4,814 Significance: * 10%; ** 5%; *** 1% . The multilevel analysis highlights that the characteristics of the teacher also play a significant role on the students' attendance, in particular the age of the teacher, the length of service in the school and the type of contract are significant.

Keywords: digital readiness, fuzzy approach, multilevel model

An exploratory study on the connection between teachers' training and meta-didactical conflict

Camilla Spagnolo - Valentina Vaccaro - Eleonora Faggiano

Data from the Large Scale Assessment can be considered as tools that can be used by teachers, not only from a systemic perspective, to design and implement meaningful teaching and learning activities. Through the practice of formative assessment, such data can also be used to return detailed information to students about their learning and in this way build reflective and metacognitive pathways, which are functional for genuine competence-based teaching (Wiliam, 2010). Since 2017, "INVALSI Group - Didattica e Saperi Disciplinari" of the SIRD Observatory (Italian Society for Educational Research) on General Didactics and Disciplinary Didactics, made up of disciplinary experts and pedagogists, has been conducting a broad research project with the aim of investigating teaching-learning processes in relation to INVALSI mathematics tests. In particular, we want to highlight the beliefs, attitudes and classroom practices of elementary school mathematics teachers regarding the data provided by INVALSI. This type of survey

allows, among other things, to identify the training needs of teachers at the national level, fitting perfectly with the aims of the SIRD. Among the broader goals of the research, in line with the purposes of INVALSI, we find the need to understand whether and how data from the Large Scale Assessment can be useful in the implementation of formative assessment. To investigate teachers' views, the researchers decided to structure a questionnaire consisting of more than 50 questions. The results of the first administration of the questionnaire (try out) were presented in the IV Seminar "I dati INVALSI: uno strumento per la ricerca" by Arzarello and Ferretti (2021) in a paper entitled "Links between the INVALSI mathematics tests and teaching practices: an exploratory study." Using the data obtained through the Try out, the researchers modified some questions and administered the questionnaire again in the school year 2019/20 to a larger convenience sample. The information collected through this survey (empirical, descriptive, and correctional) was analysed to understand how teachers read and interpret the results of INVALSI surveys related to the mathematics domain. Specifically, the questionnaire is composed of three sections, each with a distinct role: the first section is specific to mathematics education and aims to highlight how teachers interpret INVALSI tests and the corresponding results; the second section is related to aspects of general teaching and aims to highlight what beliefs and attitudes teachers have and how they pour them into teaching practices; and the third section collects biographical and contextual information. In this paper we focus attention on the data collected in the third section, correlating them with some variables obtained from the analysis of the first two sections of the questionnaire. Specifically, the third section provides a description of the sample and returns information that can be used to read the results of both the educational (section 1) and pedagogical (section 2) sections. More specifically, the purpose of our correlational analysis was to test whether there was a link between meta-didactical conflict, highlighted by the analysis of Arzarello and Ferretti (2021) in Try out and confirmed by Faggiano et alter (in press) with the Main Study data, and the number of years of service of the survey participants. The sample examined for this paper consists of 526 elementary school teachers who voluntarily took part in the research by answering the questionnaire. The geographical origin of the respondents is mainly located (71%) in the northeastern part of the peninsula. An important feature of the sample is that 90% of the respondents are tenured teachers. Among the data collected in the administration stages are age and years of service of the teachers involved. The correlation between age and years of service is high enough that the years of service can be used for our analysis. One of the components of meta-didactical conflict concerns teachers' ability to identify the reasons for students' errors, and it is this component that has a correlation, highly significant but with a Pearson coefficient that is not particularly high, with the years of service of the teachers involved in the study. An initial analysis shows, therefore, that the teachers who are new to the profession, seem to have a greater awareness in identifying the reasons that lead the student to the wrong answer. However, this finding could also be interpreted by taking into account how, over the past two decades, the pre-service training of elementary school teachers in Italy has changed radically. It is well known, indeed, that teachers trained before 2002 access teaching in primary school through the "diploma magistrale" (i.e., a qualification obtained after attending the current Liceo delle Scienze Umane), those trained after 2002 access teaching in elementary school through a degree in Science Education. In the analysis that was carried out, therefore, the variable regarding the respondents' pre-service training was also considered. The data collected allowed us to distinguish between respondents from the university course (specifically designed for access to teaching in primary schools) and those who had obtained a master's degree. In fact, in the third section of the questionnaire we had asked teachers through which degree they had gained access to teaching. The data confirm that specific pre-service training through the university pathway of Primary Education has a positive impact on teachers' ability to interpret the reasons for their students' mistakes. Years of service, therefore, would represent only one of the variables affecting the determination of meta-didactical conflict. Indeed, on the ability of teachers to identify the reasons for their students' mistakes, the training received seems to have an impact above all. The interpretative hypotheses formulated are being tested through further quantitative and qualitative investigations.

Keywords: teacher training, metadidactical conflict, math-education

THEME 3. SCHOOL AND INEQUALITY: CONTRAST AND REPRODUCTION

ORGANIZER: INVALSI- UNIVERSITY OF MILANO-BICOCCA

COORDINATOR: GIANLUCA ARGENTIN

OCTOBER 28TH: 2.00 P.M. – 4.00 P.M. {ROOM 1B ANNAMARIA – RESEARCH 9}

Social background inequality in academic track enrolment: How the role of individual competencies, teachers and family decisions varies across contexts

Moris Triventi - Emanuele Fedeli

The analysis of educational transitions is fundamental to better understand how children progress in school, develop competencies and attain educational qualifications (Mare, 1981). In many European countries children are sorted in different school tracks (Dupriez et al., 2008; van de Werfhorst & Mijs, 2010; Hanushek & Woessman, 2014). Here, the enrolment in the academic track is a fundamental transition point, which is able to affect subsequent students' learning progress, achievement and success in higher education (Blossfeld et al., 2016). The aim of this paper is to understand the main sources of social background inequalities in academic track enrolment in Italy and whether their relative importance varies across different contexts. Italy is a particularly well-suited case study since it is characterized by low educational attainment rates, high levels of educational inequalities and strong geographical divides in school outcomes. We distinguish between three main general channels by which social inequalities in educational transitions are reproduced, which are called in the sociological literature primary, secondary, and tertiary effects (Boudon, 1974; Jackson, 2013; Esser, 2016). 'Primary effects' refer to the part of socioeconomic background differences in educational transitions due to different students' academic abilities. 'Tertiary effects' capture the role of teachers in influencing students' (and their parents) educational-related decisions in enrolling in the academic track over and above the role of student ability. Teachers might affect such decisions by attributing grades and track recommendations not aligned with students' competencies due to evaluation biases (Malouff & Thorsteinsson, 2016), related to students' socioemotional skills and behaviour, as well teachers' stereotypes and discrimination (Auwarter & Aruguete, 2008; Sprietsma, 2013; Geven et al,. 2018). The residual share of socioeconomic background differences in students' academic track enrolment are the 'secondary effects', usually taught to represent heterogeneous educational decisions across families with students of the same academic ability and teachers' evaluations. We compiled a student population panel dataset from INVALSI-SNV, following 1,344 million students from five cohorts (2013–2017) enrolled in the 8th grade of lower secondary school (untracked) to the 10th grade of upper secondary education (tracked). By exploiting the large sample size, we are in the unique position to disaggregate the analysis by 103 provinces, characterized by the same education system organization but heterogeneous school quality and socioeconomic context. We use multilevel binomial logistic regression models to measure social background inequality and the KHB method to decompose it into the three channels (Karlson et al., 2012). Preliminary results indicate that families' choices, irrespective of students' abilities and teachers' evaluations, are the prevalent source of reproduction of inequalities in academic track placement, followed by tertiary and then primary effects. Interestingly, we find more geographical heterogeneity in the channels by which educational inequalities are reproduced than in the total inequality by social background, a novel finding in the literature. We also show that the role of family background is more relevant in high inequality contexts, while the role of teachers in the reproduction of inequality appears to be stronger in contexts with higher school quality. With this paper, we aim at improving our understanding of the sources of social background inequalities in academic track enrolment by looking at the role students' academic competencies, teachers' biased assessments, and family educational decisions. By taking such comprehensive view we contribute to the literature from various disciplines (sociology, educational sciences, economics of education, psychology of education) interested in analyzing the mechanisms by which inequalities are reproduced looking at the role of various actors (students, teachers, families) as well as institutional and organizational features of educational systems (Maaz et al., 2008). We move beyond methodological nationalism, by mapping geographical heterogeneity in the outcomes of educational processes. We complement the cross-national literature and provide new empirical evidence that heterogeneity across contexts in social background inequalities does not only refer to the overall level of

social disparities but also to how educational inequalities are produced. Moreover, we begin to identify contextual characteristics that might responsible for such heterogeneity.

Keywords: academic track, social inequalities, family, teachers, ability

The Voice of Students, Parents and Teachers: the hermeneutics of Data for a school as a Learning Organization

Antonio Piscopo

Teach For Italy as part of the global Teach For All Network puts the fight against educational poverty and educational injustice at the centre of its activities in Italy and in other 60 countries around the world. The lever through which TFI intervenes and tries to give a contribution in this sense are young talents coming from very different academic and professional backgrounds that share a profound believe in the possibility of the public school to be a place that facilitates and implements the conditions to promote exit ways from educational poverty and an active fluidification of the social mobility. As various studies show - among others World Economic Forum 2020 - Italy is in this sense a country in which not only the social mobility index places it at the rear of the ranking of the 82 countries examined, but also shows how the schools themselves in Italy are "social silos" – with the addition of the dimension of the North-South divide to make the picture even more complex. Teach For Italy does not have the universal recipe to revamp social mobility, nor is it the only organization actively pursuing this goal. The peculiarity of the Teach For Italy approach consists of several characteristics synthetically expressed in these points: • Selection of the teaching fellows • Training of teaching fellows before entering the service Continuing education during the school year • Accompaniment to the professional growth of Fellow teachers through didactic-pedagogical coaches • Constant exchange of international best practices with other partner organizations of the global Teach For All network • Use of a Monitoring, Evaluation and Learning system aimed at promoting a Learning Organization approach both in the organizational context of Teach For Italy, but also as a self-monitoring tool, and above all in the context of the didactic and pedagogical relationship between teachers, fellows, their students, but also parents as a tool for promoting educational alliances. Already last year our Monitoring, Evaluation and Learning (MEL) system was at the center of Teach For Italy's intervention at INVALSI Seminar. The perspective in that case was on the entire Monitoring, Evaluation and Learning system in terms of a general approach and the possibility for the involved stakeholders to extract value from the data they themselves create in terms of self-reflection and input towards shared change processes. This year, for the VII edition of the Seminar, the emphasis of the contribution will place at the core the value of the structural inclusion of the voices of students and parents through a decentral/peripheral evaluation, but also as an aid to didactic innovation and to to foster a broader leadership in terms of a strong educational alliance between teachers, students and parents. The contribution will decribe the model and the methodological approach that during the first two years of the Teach For Italy generated not only useful data for the general evaluation at the central organizational level, but also data useful for didactic and pedagogical purposes, which for Teach For Italy teaching fellows are not only linked to the "curricular" dimension, but also to the generation of a healthy co-responsibility of students and parents around student's educational path and growth. To frame our approach and its specific peculiarities, as well as its evolutionary path from last year, here is a general framework of the guiding principles underlying the Teach For Italy Monitoring, Evaluation and Learning system and its tools. The MEL system: guiding principles Collecting data is only a means that - if used well - serves the function of better understanding what we do, of generating questions about our activities. Our assumption is that "monitoring and evaluating" has a direct influence on what is measured and evaluated. This is the reason why we want our "MEL" system to be a way of defining ourselves as an organization, a platform aimed at facilitating learning for all involved stakeholders involved in the activities promoted by Teach For Italy and – used in this way – an impact accelerator. The dimensions of impact: Our MEL system is used on three impact dimensions: our fellows; our students; and the educational ecosystem. In each of these, the MEL intends to play a role by involving the most important stakeholders making them real participants of a larger learning process. The Fellows We want our Fellows to become the best Italian teachers in the two years of the program, and to transform

themselves into leaders and players of change in the future. For our Fellows the MEL intends to be a platform for reflection on their personal and professional growth and their impact by promoting: Self-Reflection Impact-oriented teaching skills An approach to participatory learning Students We want our students to feel co- responsible for their own growth and their educational path. The MEL aims to listen to their feedback, strengthen their voice while developing their meta-cognitive skills through: Understanding their development Enabling meta-cognitive skills Promoting "Student Leadership" The systems We want Teach for Italy to foster a systemic change in the fight against educational inequalities by involving the main stakeholders of the educational ecosystem around the student both at the local level and at a broader systemic level. Our MEL intends to actively listen to these actors of the educational ecosystem while at the same time promoting dialogue through: • Active dialogue with school principals • Dialogue and involvement of parents • Interconnection between didactic and extra-didactic dimensions (educational alliances in the territory) • Promotion of a shared spirit towards the challenge of educational inequality The tools Our MEL system aims to promote a strong culture of a multilevel "Learning Organization" by using 9 tools to be implemented starting from the Training Summer School and during the school year by acting on all three the dimensions of impact: 1. Monthly reflection "'L' come Learning Together" Teach For Italy Staff and Fellows meet once a month to reflect on the issues related to the challenges we are experiencing, the impact we are unfolding and the way we work together. In this monthly session the data provided by the MEL are discussed and interpreted together. A the end of every year the aggregated data are analyzed in a workshop involving all teaching fellows and staff members. 2. Fellow Self-Assessment Fellows will be asked to reflect on their own development and on their being Fellows through a survey oriented to the Leadership Development Framework. 3. Cycle of observations and growth conversations The tutor will observe the Fellows during their teaching activities. Observations will be based on the Student Rubric. Separately, the Growth Conversations will focus on developing the Fellows in terms of growing their leadership and provide space for individual reflection. 4. Student Growth Monitoring Fellows understand and reflect on their impact through regular monitoring of their students' development in the three areas related to the Teach for Italy Student Vision: Personal Leadership, Academic Achievement, Active Citizenship. 5. The voice of the Students Fellows learn from their Students through a circular feedback system based on two moments: 1. Students give Feedback to Fellows through a short anonymous survey; 2. The survey results are returned to the class and discussed together. 6. Student Constituent Voice and Student Development Monitoring take place in pre-established and regular time windows lasting one week. 7. The Voice of Parents For the first time in the 2021-2022 academic year, a system for including, structuring and strengthening the voice of parents was piloted in two classes. The tool tries to summarize the categories contained in "Student Growth Monitoring" and "Student Voice". Also in this case, the moment of data collection is followed by the return of aggregated data in the form of plenary sessions in which parents and teachers (where possible also of the students themselves) interpret the data and make it the basis for a comparison on the educational project for children. students. 8. Teach For All Student Survey This is an extensive survey administered internationally by nearly all organizations in the Teach for All network that aims to learn what our students think about the relationship with Fellows and our approaches. The Teach for All survey is administered twice per school year. 9. School Leadership Survey and Return This survey is administered once at the end of the school year. It is a way to listen and collect the perceptions of school leaders on the work of our Fellows, in general on the Teach for Italy program and on the impact on both students and the school. At the same time, the survey aims to involve school leaders in the process of learning and improving our activities and the program, enabling a strengthening of a structural dialogue with these key players in the school system. At the end of each school year, a return meeting will be organized in which to share the results of our observations on the impact of the program on both students and fellows.

Keywords: voice, learning, leadership, evaluation, trasformation

School segregation in Italy: a longitudinal study using INVALSI data

Giovanni Abbiati - Gabriele Ballarino

By the term segregation in Sociology we mean the extent to which individuals belonging to different social groups are spatially separated from each other. Social groups can be defined by gender, family status, ethnic origin, or any other ascribed variable. There are different dimensions of segregation which are related to different spaces or areas of social interaction: residential segregation; occupational segregation; school segregation. The is a long-lasting debate in Sociology about the causes and determinants of segregation. Over time, two different interpretations have emerged. The first, known as "homophile segregation", has gained prominence since Coleman et alter (1975), in the wake of the debates on the effects of the school de-segregation efforts taking place in those years in the United States. A different strand of research emphasizes instead the active role of institutions and political entrepreneurs in favoring homophile practices, contesting the idea that segregation is somehow a natural outcome of social process. Kruse (2005) for instance, showed how both residential and school segregation in the South of the USA has been favored by political and institutional initiatives, aimed at favoring the exit of the white, middle class residents from urban contexts. The complex interaction between political and institutional contexts and the incentives that are there created for homophilic choices (intentionally or unintentionally) is still little studied in contexts outside the US. The effects of school segregation have received considerable attention. Research on peer effects has shown that the composition of schools and classes in terms of gender, ethnicity and family status appears to be strongly associated with both school performance and out-of-school behavior (Epple & Romano, 2011; Priest, 2011). It is difficult, though, to assess causality, because the composition of the class can interact with the characteristics of the students. For example, in Italy the percentage of classmates of foreign origin is negatively associated with the results of students with a weak family background, while there is no association with the students from educated families (Contini, 2013; Frattini & Meschi, 2019), for reasons that have still to be cleared. In recent decades scientific research has revealed the existence of relevant patterns between the composition by social groups of schools and classes and school learning. The existing literature, largely produced in English-speaking countries, has mainly focused on segregation on an ethnic or socio-economic basis, while very scant evidence is available for Mediterranean countries and for other dimensions of segregation (such as parental education). This article explores school segregation in Italy at the national level using 7 consecutive waves of INVALSI data (2010-2019), collected at the census level in grades 2, 5, 8 and 10. We use two measures of segregation: the dissimilarity index (Duncan's D), and the exposure index (Bell's P). The dissimilarity index measures, for each territorial unit, the evenness of the school distribution by social group, as compared to a situation of perfect equidistribution. The index, which varies between 0 and 1, can be interpreted as the proportion of individuals who should be relocated (in this case, to other schools) to obtain an equitable distribution. This index adopts a macro perspective, unlike the P index (always expressed on a scale from 0 to 1), which instead captures micro level interactions, because it describes to what extent individuals belonging to a particular group come into contact with members of other groups. The student-level variables on which the segregation indices are calculated are represented by the level of education of the parents (high: at least one parent with a university degree; medium: both parents with a high-school diploma; low: no parents with a diploma – calculated using the dominance criterion) and migratory background, coded using the indicator provided by INVALSI (natives; I generations; II generations). We use as territorial units both provinces and commuting zones. Preliminary results indicate that: 1. The levels of segregation do not increase passing from primary to secondary schools educational level, as we expected because of school tracking. With respect to social origins, the levels of Duncan's D are estimated to be around 0.3 for both students from educated and non-educated families, and around 0.2 for the students of families with middle level of education; as concerns migratory background, these values are estimated around 0.4, meaning that, hypothetically, 40% of the students population should be relocated in order to reach an equitable distribution. 2. The levels of segregation as measured by Duncan's D are stable over time both in the case of social origins and in the case of migratory background, despite the change in the relative sizes of the groups. 3. The latter phenomenon is reflected, at least in the case of social origins, in the increase in the exposure of the children of poorly educated parents to their peers from educated families. 4. The geographical distribution of the phenomenon indicates higher levels of segregation in the South and in the islands than in the Center-North. Preliminary conclusions seem to indicate then that residential segregation (likely to fuel school segregation by "proximity" in elementary schools) is translated into school segregation. The tracking system, which separates students into different

school on the basis of the curriculum at the beginning of grade 9, does not seem to exacerbate the overall level of already existing segregation. Further analyses are needed to complete this descriptive account of school segregation in Italy. Two main issues need to be tackled. First, the analyses have to be enriched with a finer-grained grid of territorial aggregates within the which segregation can be assessed. Second, some aspects related to INVALSI data (namely, the coverage of 10th grade schools in INVALSI data) need to be ascertained.

Keywords: school segregation, migratory background, social origins

Hard times, bad students? The effects of technological change on educational outcomes

Paolo Agnolin

Globalization and technological change are two structural and comprehensive phenomena that are changing not only economies, but also modern societies down to their very deepest roots. The idea that the economic changes generated by, for instance, financial crisis, international trade or technological innovation, can have strong repercussions on social and political dimensions, has become popular in the last decades. In particular, evidence suggests that the automation of routine tasks and the exposure to international trade in some sectors has contributed to changing earnings distribution and declining employment shares of some traditional occupations across a broad range of advanced economies (Autor et al., 2013; Goos et al., 2014). These radical economic mutations have expanded their effects and stimulated research on a disparate set of other social dimensions other than labor market outcomes, such as social mobility (Berger & Engzell, 2020), health (Colantone et al., 2015; Venkataramani et al., 2020), voting behavior (Autor et al., 2016; Colantone & Stanig, 2018; Anelli et al., 2019), family dynamics and fertility (Anelli et al., 2021). However, an aspect that has been overlooked by economic and sociological research pertains the effects of technological change on the educational outcomes of students in developed countries. Education is a key issue in understanding how to deal with large-scale changes. Given the pressure that globalization and technological change bring to economic systems, labour markets and societies, the creation of human capital is considered as the true ubi consistam to effectively respond and adapt to the evolving conditions. For instance, investments in life-long learning and professional training are often mentioned as the natural policy responses to technological unemployment. The basic rational for this is that, as labour market changes, then current and future workers should be empowered with the tools, such as ICT skills, to find a decent occupation. If, on the one hand, investments in human capital are considered to be the royal road for improving the occupational perspectives of workers, on the other hand the effects of economic changes on the educational outcomes of students have received little attention. Two different hypotheses are tested in this paper. First, we test the hypothesis that parents' occupation and educational attainment are strong predictors of students' school performance, with increasing polarization across the performance of students from different socio-economic backgrounds. The second hypothesis anticipates that the effect of the automation shock on students' performance is heterogeneous, being negative for the children coming from families with lower socio-economic background and with parents working in the more automatable and routine-based occupations. Micro-data information on students' educational outcomes is obtained from INVALSI. These data are particularly suitable for our purpose because they do not only provide students' performance in standardized, blindly-graded, tests (administered at the national level) in Italian, Mathematics and English and teachers' grades on the mid-term evaluation in the same subjects (derived from administrative registers), but also socio-demographic student characteristics and the occupation and level of education of the parents. EU-LFS is also employed to construct the indicator for automation risk. The main methodological challenge of the paper is the design of an indicator for the individual exposure to automation risk that can be linked with students' performance. Given that INVALSI data only distinguish between nine broad categories for occupation, a measure allowing to exploit a larger variability is constructed in the following way. I exploit EU-LFS data on Italy to estimate exposure to automation of parental occupation using a model in which the dependent variable is the sum of a vector of predicted probabilities in any ISCO-88 2 digits occupation, which is predicted using a standard linear model

with INVALSI occupation categories, gender, citizenship status, educational attainment of the father or mother and, importantly, the region of residence. All explanatory variables are present in both the EU-LFS dataset, which also include very detailed occupation, and in INVALSI dataset. Then, the vector of predicted probability is weighted using automation scores, such as the one provided by Frey and Osborne (2017). I then estimate a regression equation that is aimed to investigate the association between automation risk and educational outcomes, controlling for a set of individual characteristics. I begin by documenting the existence of a strong association between parents' occupation and children school performance. I show that students from lower socioeconomic background perform worst in math standardized and blindly graded tests as opposed to their peers from more affluent family backgrounds. The gap between performances in the Italian elementary school, however, has been widening over the years. This means that a lower socioeconomic background has a more negative association with performance after labor market polarization occurred. I theorize that at least part of this polarization can be explained by labor market dynamics and changes in the occupational structure, as driven by automation and technological change. I thus assign to Italian students a score of parental exposure to technological change based on family occupational background and demographics, as well as region-specific trends. Finally, I show that students with parents characterized by exposure to automation risk exhibit lower educational performance, as opposed to peers from socio-economic background that are less threatened by technological change.

Keywords: automation, education, inequality, intergenerational mobility

THEME 14. INTERNATIONAL LARGE-SCALE ASSESSMENTS (ILSAS) METHODS AND RESULTS

ORGANIZER: INVALSI

COORDINATOR: MARIA MAGDALENA ISAC

OCTOBER 28TH: 2.00 P.M. – 4.00 P.M. {ROOM 2 GIULIA – RESEARCH 10}

Addressing two methodological challenges when students rate their classroom discussion

Diego Carrasco

Past research in civic education has positioned open classroom discussion of political and social issues (OPD) as key school practice, promoting different citenzhip outcomes including civic knowledge (Isac et al., 2014), support of egalitarian values (Carrasco & Torres Irribarra, 2018), political efficacy, among others (Knowles & McCaffertyWright, 2015). OPD scores are generated using student responses to different reference-shift items, reffering to what teachers do, and what students do as a group. If the rating nature of this measure is ignored, we are at risk of arriving to wrong conclusions due to model miss specifications. Two methodological problems are presented for this scenario. The first problem concerns what model specification is more interpretable, when comparisons of learning environments are of interest, with reference-shift item scale scores. The second pertains to the varying inter-rater agreement between students from different schools. These can vary greatly, and the sole exclusion of low agreement schools as a solution can lead to a considerable loss of sample (Lüdtke et al., 2006). The present study is an effort to respond to these two methodological challenges. In the following sections, we describe the data we used to illustrate these two problems, and for each problem, we propose an alternative model specification. We used data from the International Civic and Citizenship Education Study from 2016 (ICCS 2016). This study provides representative representative samples of 8th grade students, using a two stage design, with intact classrooms. To illustrate the two identified problems, we use data from Italy (problem 1), and Perú (problem 2), as these two countries are ideal examples for the methodological challenges here discussed. The observed data includes 3450 students and 170 schools from Italy, and 5166 students and 206 schools from Perú. Dependent variable. Civic Knowledge (y_ij) scores represent students' political understanding of political issues. It consists of five plausible values, generated with IRT Rasch model over a random booklet design of 87 item-test. Independent variables. To illustrate the presented problems, we are using two variables. Socioeconomic Status (ses_ij), is a score created based on the Parents Education level, Parents Occupation, and number of books at home. OPD scores (opd_ij) is a reflective measure of the school environment regarding the frequency of discussion of political and social issues at school. OPD scores are IRT scores, generated with a partial credit model (Masters, 2016). In the following sections, the two problems are illustrated and addressed separately. All estimates are pseudo maximum likelihood estimates, where survey design weights and plausible values are accommodated accordingly (Rutkowski et al., 2010). Problem 1: wrong model specification To illustrate the problem of wrong model specification, we will fit a compositional model over civic knowledge, using the OPD scores. This model is equivalent to a Mundlak specification (Bell et al., 2018), and is commonly used to get compositional effects of socioeconomic status over educational outcomes (Caro & Lenkeit, 2012). In this model, the school level efect of aggregated OPD scores, would be interpreted as the school level effect of OPD. However, this model does not retrieve the relationship of interest. When we want to compare learning environments, we are interested in the difference between school environments as a whole. A more appropriate parametrization is the fully disaggregated model (Rights et al., 2019). In this later model OPD scores are centered with their respective school means at level 1. This centering specification changes the meaning of the between school estimate. This latter estimate is not a partial effect, but an overall relationship between school means of OPD scores, and civic knowledge scores school random intercepts. Thus, it represents the parameter of interest when comparing schools regarding a school practice reported by the students. In the case of Italy, the within school effect and the between school effects of OPD scores are of similar size. Thus, this example renders the extreme case, where the compositional model specification erases the effect of interest. As such, the compositional model can lead to the wrong conclusion that OPD has null effects on civic knowledge between schools, if and only if the compositional effect is interpreted as a learning environment effect. In total 6 out

of 24 countries, present a similar scenario of Italy. In Italy, Slovenia, Russia, Latvia, Norway, and Belgium, there is a risk of making the conclusion that OPD school levels are not relevant to explain civic knowledge between schools. Problem 2: students rating agreement When different members of the same group do not show similar rating scores regarding the level of a group attribute or context factor, then it is difficult to consider the group mean score as a convincing representation of the rated attribute. A common advice found in the organizational behavior literature is to assure a certain level of inter-rater cluster agreement. If this agreement is not reach, one can exclude the groups with low agrement. However, this recomendation can incur in a severe loss of sample. Moreover, agreement indexes have uncertainty, and this uncertainty depends on the intraclass correlation and the clusters' group size. As such, cut off scores are not easily generalizable to different scenarios (Lüdtke & Robitzsch, 2009). How much agreement we need between students, when these are rating their learning environment? To illustrate the following problem, we select Perú data from ICCS 2016. This is an ideal example because OPD scores present enough variability of students agreement. Under the standard recommendation, of discarding all schools below the agreement threshold we could loose 23 of 206 schools from the peruvian sample; this implies discarding 18% schools of the projected population of schools using the survey design. In turn, we propose to keep all schools, and assess what is the relationship of OPD school mean scores, conditional to a dispersion score that represents the lack of agreement between students. For this puropose, we fit a disagreggated model using the OPD realizations of a multilevel IRT model. This response model allows to retrieve within and between components of the OPD scores. Additionally, we estimate delta_j, which represents the school level standard deviation of the OPD scores. This later variable is a dispersion score, a measure of how much students vary in their ratings in each school. We fit a model, where the dispersion score is added as main effect, and as a moderating effect for the between level effect of the OPD scores. This model is similar to a climate strength model, where the withing group variability of common perceptions of a group attribute is considered a moderator of the group attribute effects (Schneider et al., 2002). However, in the present model specification dispersion scores are in the reverse direction of a climate strength index. We will call this model specification, a dispersion effect model. In this model, the between school effect of the OPD scores are estimated, at average values of students' socioeconomic background, and at the average level of disagreement between students from the same school. The dispersion effect model permits to estimate the critical point where a lack of consensus between students from the same school compromise the estimates of a referent-shift items scale scores. This critical point, can be illustrated with Johnson-Neyman plots, as the dispersion effect model has a between school effect interaction. In the present study, we have shown two methodological problems for reference shift scale scores. The first problem consists of relying on the compositional model specification when the relationship of interest is between schools. We illustrated this problem with the most extreme case when the within and between effects of the reflective measure scores are of the same size. The compositional model overcorrects the estimate of interest (Lüdtke et al., 2009). The present problem can be address by recurring to the fully disaggregated model (Rights et al., 2019), which directly retrieves the effect of interest as a between estimate. The second problem refers to students' inter-rater variability on reflective measures. These can vary significantly between students from different schools and may compromise the relationship under study. For this problem, instead of removing groups with low agreemnt, we use a dispersion effect model. The propose model allows to identify where the between school estimates are compromised, conditional to the values of lack of agreement between students ratings. With the proposed model, the relationship of interest at average levels of lack agreement. The approaches presented here are applicable to any reference-shift item scale scores. This type of measures are frequently used in education, especially in large scale assessment studies, where is common to rely on students and or teachers' responses to generate information about school level attributes.

Keywords: open classroom discussion, reflective measures

Attitudes toward gender equality among Italian 8th-grade students. An analysis of its distribution and shaping process using IRT and Zero-Inflated Models

Natalia López-Hornickel - Diego Carrasco - Andrés Sandoval-Hernández

Why are attitudes toward gender equality critical at all? There is evidence of how sexist attitudes promote gender inequality in different backgrounds. Brandt (2011) found that countries with a higher level of sexist attitudes also present a higher level of gender inequality. Dotti Sani and Quaranta (2017) also evidenced how adolescents reproduce prevailing societal discourse about gender inequality, so they are likely to reinforce the status quo in contexts with greater inequality. We can expect that an attitude of support toward gender equality allows greater justice and avoids discrimination against women. Although progress has been made on gender equality, there are significant gaps in several dimensions (Bettio, Tinios, & Betti, 2013; Dotti Sani & Quaranta, 2017; Krook, 2010). This situation appeared even more evident during the pandemic. For instance, mothers had to reduce their working hours to care for their children four to five times more than fathers (Collins et al., 2020), or as a stepper decline in mental wellbeing for females than males (Etheridge & Spantig, 2020). Specifically, Italy still holds a significant level of gender inequality in several areas (Menniti et al., 2015; Newell, 2020). Notably, there is a critical prevalence of occupational gender stereotypes among adolescents, where young males and females tend to prefer jobs that are gender-stereotyped and segregated (Ginevra & Nota, 2015), and also in dimensions such as sexual orientation, where young Italian males tend to present more negative attitudes toward homosexuality than females (Santona & Tognasso, 2018). In this sense, inequality is an issue among young people (Sánchez et al., 2021). Much evidence regarding support attitudes for gender equality has focused on the adult population (Dotti et al., 2017). However, it is essential to consider the socialisation of young people since they constitute part of the social world and will be the adults of tomorrow. Gender biases during adolescence could promote the exclusion of women and girls, which causes women to have lower motivation (Davis & Greenstein, 2009) and poorer student achievement (Logel et al., 2009), among other outcomes. Additionally, previous research has analysed these attitudes, assuming normality in their distribution. However, empirically, it is usual to observe some peak distribution far from the centre, creating skewed distributions. For instance, this is the case of attitudes toward bullying among students (Carrasco et al., in press). Consequently, traditional methods can underestimate the effect of covariates over the outcome variable, undermining the impact of possible programs to deal with these attitudes. Moreover, given the need for more equitable societies between women and men, it becomes essential to distinguish between those young people capable of adhering to egalitarian attitudes integrally and those who are not. This can be a necessary input for the construction of public policies. This research has two specific objectives. First, it will identify the adhesion to attitudes towards gender equality among Italian young people. To achieve this objective, Item Response Theory models will be used to identify respondents' endorsement of the gender equality support attitudes (unobservable attribute) (Wu et al., 2016), recognising the type of scale distribution. Second, each part of the distribution will be conditioned through a zero-inflated regression to understand how some factors are associated with young people who support gender equality attitudes (peak of the distribution) and with the others who are not fully supportive of these attitudes. This will help us to understand what is happening with those students who are not answering the top category of agreement with egalitarian statements. The data corresponds to the IEA's International Civic and Citizenship Education Study (ICCS) 2016. This study "investigates how young people are prepared to undertake their roles as citizens in a world where contexts of democracy and civic participation continue to change" (IEA website, 2021). It contains questions about civic knowledge, civic attitudes, expected participation in different instances among students, and information about school principals and teachers. The selected sample is nationally representative and is conformed of 8th-grade students in Italy. Specifically, the sample comprises 3450 students (Schulz, Carstens, Losito & Fraillon, 2018). As part of the factors considered, gender, mother's educational level, and open discussion in classes were included in the models. Regarding the results, just 33% of Italian students fully support gender equality attitudes. In this sense, it is critical to note that there is no homogeneous behaviour. The other part of the young population that is not at the peak (zero-inflated) presents different percentages of adhesion to gender equality attributes. Although a critical portion of young people demonstrates full adherence to fairness, there is still work to do. These results reaffirm the idea of essentialist egalitarianism (Sánchez et al., 2021), which also exists among the younger population. Through the zero-inflated regression model, it is possible to observe that being a woman, the mother's educational level and open discussion in classes go in opposite directions for the different parts of the distribution of

the outcome variable. For those who fully support gender equity, these are positive predictors. On the contrary, it translates into a negative relationship for those not fully supportive of gender equality. The importance of this work relies on identifying those students who demonstrate full support for gender attitudes versus those who do not. Thus, recognising the dimension of the problem with those young people who do not believe in more equal societies. Likewise, identify those school practices that can promote a higher adherence to more fair values. This study aims to contribute to the study of attitudes toward gender equality, diagnose their distribution, and the current situation of support among 8th-grade students. This is critical to understand how urgent it is to promote democratic values among young people and have educational policies to disseminate them.

Keywords: gender attitudes, adolescents, large-scale assessment

Youth dispositions to participate in disruptive political actions across countries and years: the gender and socioeconomic's gap in unequal contexts

Daniel Miranda - Juan Carlos Castillo

In recent decades there has been a relevant increase in social mobilizations against governments (Brannen et al., 2020), questioning the legitimacy of democracy as a form of government (Della Porta, 2013; Dalton, 2015). Young people have played a significant role in these mobilizations, being the main actors in the various forms of political action observed, from traditional peaceful marches to more radical forms such as taking over buildings, blocking traffic or scratching walls with protest slogans. The literature shows that the various forms of participation show important gaps, being the most relevant socioeconomic conditions (Brady et al., 1995, 2015; Castillo et al., 2015) and gender (Martinez & Cumsille, 2010; Cicognani et al., 2012). However, the studies have focused on traditional forms of participation, leaving less coverage of the gaps in more radical forms of involvement. Some recent studies show that the socioeconomic conditions of origin (Hoskins & Janmaat, 2019; Sánchez & Miranda, in press) and gender (Schulz, 2019) play an important role in understanding the willingness to engage in these more radical forms of political action. In addition, there are significant differences across countries in this regard (Tapia et al., 2021). This study aims, first, to assess socioeconomic and gender gaps regarding adolescents' willingness to participate in disruptive forms of political actions. To this end is proposed to analyze the willingness of adolescents to participate in various forms of radical political participation, comparing the differences between countries and over time, using the three large-scale civic and citizenship education studies developed by the IEA: CIVED 1999, ICCS 2009 and ICCS 2016. Additionally, it is proposed to evaluate the role of inequality conditions (measured as Gini index) to explain the differences in the dispositions of these forms of political action among countries. A large number of countries participated in each of the aforementioned studies: 28 in CVIED 1999, 38 in ICCS 2009 and 24 in ICCS 2016, achieving a sample of more than 400,000 students considering all time point measures. It is expected to use the hole sample and countries. Regarding the variables to be analyzed, they correspond to three comparable items that evaluate the willingness of students to participate in protest activities such as "scratching walls", "blocking traffic" or "participating in the occupation of a building". For the analysis, the responses were coded to that those students who respond “I will or probably or I will do it for sure” are coded as 1 and those who respond “I will not do it or probably will not do it for sure” are coded as 0. Thus, it is possible to estimate the rate of willingness to participate in disruptive political actions. To evaluate those factors associated with disposition, some variables that are comparable between studies are used. First, the sex declared by the student is considered. Second, the educational level of the family is used. For simplicity, a dummy variable considers parents with a university education as 1 and parents with a lower educational level as 0. Additionally, the Gini index of each country was retrieved from the Standadized World Income Inequality Database (https://fsolt.org/swiid/), considering the year corresponding to the study: 1999, 2009 or 2016, respectively). Regarding the statistical modelling, a series of descriptive strategies were used to allow, in the first place, to estimate the rate of willingness to participate in each form of action in each country and year of the study. This estimattion consider the study's sampling complex design, taking into account the sample weights, stratification and primary sampling units (schools). Employing graphical tools, shows the variations among countries, types of participation and variations over

time. A series of multilevel logistic models estimates the effect of the predictor variables. With this technique, evaluates the gender and socioeconomic gaps, considering whether these gaps work as a fixed or random effect across countries. In addition, a set of cross-level interactions evaluates the effect of the context of inequality at the national level on the average levels and on the mentioned gaps. The preliminary results shows interesting insights about the willingness of young people to participate in disruptive or blatantly illegal activities. First, of the forms of political action evaluated, it is systematic that scratching walls have a higher disposition rate than blocking traffic. At the same time, young people are more willing to block traffic than to take over a building, which may be linked to the degree of disruptiveness or how easy it is to carry out said political action. This occurs in all the countries and the three years analyzed, with very few exceptions. It seems that different forms of political action have different meanings for students. Additionally, it is interesting that in some countries students tend to maintain their levels of disposition and in others increase relevantly, showing that differences are not only in levels but in trends as well. Second, girls consistently show a lower willingness to engage in disruptive political action than boys. This occurs in CIVED1999, ICCSS2009 and ICCS2016. Third, those students from families with university education show a lower willingness to participate in disruptive actions than young people from families with higher educational levels, showing a relevant difference from previous evidence about socioeconomic gaps in youth political participation. Fourth, regarding the relationship of this type of protest with the conditions of inequality, the result shows that students in countries with higher levels of inequality (measured with the Gini index) declare a greater willingness to protest disruptively. This result occurs in 2019 and 2016, but not in 1999. The results generated will be discussed in light of temporal and between-country variations. In addition, the gender and socioeconomic gaps observed, and their possible variations between countries will be discussed. Finally, the role of the conditions of inequality will be discussed to understand the changes in the relationship of the new generations with politics.

Keywords: political participation gap, political inequalities

Citizenship norms in early adolescents. An historical-comparative analysis of 46 countries (1999-2016)

Cristobal Villalobos - Diego Carrasco - Catalina Miranda - Ernesto Treviño

The definition of citizenship norms is always contextual, due to the fact that the scope of the definition of citizenship as well as the norms relative to citizens' behaviors are historically and geographically located (Villalobos et al., 2021a). For example, in Asia the influence of Confucianism and Taoism have shaped a notion of citizenship norms based on duties, emphasizing the respect to norms and correct behaviors (Dalton & Ong, 2004; Chang, 2016). Conversely, in Western societies prevalent perspectives on good citizenship are based on liberal or communitarian norms (Mayne & Geißel, 2018). Besides the geographic and cultural factors, there are also historical transformations that shape the notions of citizenship norms. For example, in the 1960's good citizenship was marked by notions of patriotism and sense of national responsibility (Theiss-Morse, 1993), while in the 1970's and 1980's good citizenship changed its emphasis towards political participation (Dalton, 2008). More recently though, good citizenship has been impregnated by the role of technology (Ke & Starkey, 2014), gender equality (Bolzendahl & Coffé, 2009) and migration (Fernández & Kriegbaum, 2017). Considering that, the article aims at understanding the continuities and discontinuities in the notions of good citizenship between 1999 and 2016 among students aged 13.5 years old. Using three rounds of the studies of the International Association for the Evaluation of Educational Achievement (CIVED 1999, ICCS 2009 and ICCS 2016), the article explores the trends, changes and factors that influence the notions of citizenship norm in two decades. Although the literature on good citizenship has grown in recent decades (Villalobos et al., 2021b), most of the studies have sought to understand how good citizenship is related to individual variables such as socioeconomic status, gender, and ethnic background (Peled, 1992; Alazzi & Chiodo, 2008; Bolzendahl & Coffé, 2009). Furthermore, the literature that has focused on understanding cultural and geographical differences has done so through the study of civic norms in a specific region or country, such as the US (i.e. Dalton, 2009), Europe (i.e. Coffé et al., 2010), or Sweden (Fernández & Jensen, 2017). In contrast, this article uses a methodology which

considers multiple cases (46 countries or regions) with three measurements during a 20 years period. This allows us to study temporal trends, as well as the influence of economic, political and cultural variables (Fishman & Lizardo, 2013) on the configuration of citizenship norms. 2. The study follows a comparative approach (Bray et al., 2014) pooling the data from the three studies and the student observations of the 46 participating countries in Europe, Asia, Oceania, and America. The key variable of this study is the percentual distribution of the five profiles of citizenship norms in students (see: Torres-Irribarra & Carrasco, 2021). These profiles are the result of a homogeneous Multigroup Latent Class Model using 12 items available in the three studies in an almost identical form that answer the question: "For you, what does it mean to be a good citizen?". The profiles group students with similar propensities to adhere to different forms of citizenship norms. The five profiles are defines as comprehensive, socially-engaged, duty-based, monitorial, and anomic (Torres-Irrribarra & Carrasco, 2021). Students within the comprehensive profile are those that consider all the civic norms as important. Conversely, students in the anomic profile regard all the civic norms as not important. Students in the monitorial profile value non-conventional forms of political participation, with lower adherence to more traditional norms such as participating in political parties or political discussions. Socially-engaged students exhibit high levels of adherence to norms related to the protection of the environment, the promotion of human rights, and the participation in community activities. Finally, duty-based students highly adhere to norms such as obey the law, working hard, and voting in each election, while show lower levels of adherence to norms such as participating in peaceful protests and political discussions. To explore the factors that may influence on the proportion of students in each profile, we use economic, political, and cultural variables in each country-year. GDP per capita and Gini Index are the economic variables used. In relation to political factors, we included a variable to compare the political regimes, using the V-Dem survey (Coppedge et al., 2019) classifying countries in four types of regimes: i) closed autocracy; ii) electoral autocracy; iii) electoral democracy; and, iv) liberal democracy. In terms of cultural variables, we use the consumption of digital media in the countries. This variable is reported in the V-Dem survey (Mechkova et al., 2019), and the higher the values of this indicator the higher the consumption of digital media. Aditiconally, we use the percentage of the population that adheres to a religion as a second cultural variable. Finally, we use the geographical zone. In trying to capture contextual variations, we consider the following six geographical regions: i) Asia; ii) Oceania; iii) North America; iv) Latin America; v) Central – Eastern Europe, and; vi) Western European. The decision of dividing Europe into two groups responds to the difference on civic results when contrasting post-communist countries with Western European ones (Mirazchiyski et al., 2014). To analyze these data, we run descriptive and beta regression model analysis. Four main results can be highlighted. First, there are trends that stay relatively stable over time. In this realm, in all the years and geographical areas anomic students are a minority of the total, representing less than 5% of the total population in every year and geographical zone. In a similar vein, the proportion of duty-based is similar across regions, a finding that is aligned to the findings of Dalton (2008) in relation to the loss of duties as central to youth citizenship. In any case, there are important differences across regions in the percentage of duty-based students. In Central-Eastern Europe and Asia the percentage of duty-based students is approximately 10%, in Western Europe and Oceania the percentage is near 15%, while in America is nearly 10%. Second, in all the regions - with the exception of Latin America - there is a diminishing trend of the percentage of monitorial students. For example, in Western Europe monitorial students change from representing 26,4% in 1999 to 13,5% in 2016, while in Asia the decrease is similar moving from 18,9% in 1999 to 10,3% in 2016. This trend may be due to the process of involvement of youth during the first decades of the 21st century in countries as different as Spain, Chile, Turkey, and the USA (Castells, 2012). Third, and looking at the specific trend of each country, three distinct trends can be observed. On one side, Nordic countries —Norway, Sweden, and Denmark— show the highest increases in the percentage of duty-based students during the period under analysis. Contrary to the rest of the sample, in Nordic countries it seems that the sense of duty and responsibility are key elements of good citizenship among youth. It is noticeable that in Denmark, where 35.8% of the students in 2019 fit into the duty-based profile, a situation that may be suggesting that there are new configurations of citizenship marked by nationalism and discussions on immigration (Jenne et al., 2021). Second, the anomic students tend to be stable or diminish over time in most of the countries, with the exceptions of Chile, Hong Kong, and Colombia. These three countries have suffered youth protests and revolts against the political system in the last decade, a phenomenon that may explain the increase (Brimblecombe, 2020; Somma, 2021). Finally, and important part of European countries, like Belgium, Denmark, Estonia, Finland and Italy show an important growth on the percentage of comprehensive students. In all the cases, this growth has as a counterpart a decrease in the percentage of monitorial students, a finding that may suggest a change in the

configuration of good citizenship over time by including elements such as participation in protests and institutional policies, elements that have been valued by youth in recent decades (Michalski et al., 2021). In this line, the case of Italy is paradigmatic, with a growth of more than 20% in comprehensive students (33.9% in 1999 to 57.5% in 2016) and with a strong decrease in monitoring students (24.1% in 1999 to 10.8% in 2016). The incorporation of first and second migrant generations in the political debates (Riniolo & Ortensi, 2021) and the growth of "weak" forms of political engagement, such as consuming news, discussing politics in small circles, do political self-expression or use social media in Italian young (Paolillo & Gerbaudo, 2022) are factors that could explain the passage from passive views to more active views of citizenship in the case of young Italians. Finally, the results of the beta regression show that the proportion of religious population and the geographical area are factors that permit explain the changes in both comprehensive and duty-based students. This may be confirming the weight of culture and the relevance of the “Asian values” and the cultural persistence in the “two Europes” in the configuration of citizenship among youth. And the same time, and contrary to what we hypothesized, the economic and political variables included in the analyses do not explain the distribution of students across the different profiles.

Keywords: citizenship, large-scale assessment, comparative analysis, ICCS

THEME 13. SELF-EVALUATION REPORT (RAV) AND INVALSI DATA FOR THE SELF-EVALUATION OF ITALIAN SCHOOLS

ORGANIZER: INVALSI

COORDINATOR: MICHELA FREDDANO

OCTOBER 28TH: 2.00 P.M. – 4.00 P.M. {ROOM 3 LUDOVICA – RESEARCH 11}

Achievement and self-evaluation questionnaires: a tool for school improvement

Marilena Salsano

The general factors that influence student achievements (Edmonds, 1979; Levine & Lezotte, 1990; Scheerens & Bosker, 1997, Sammons 1995; 1999; Marzano 2000; 2003), have been grouped (Scheerens, 2018) into: 1. Performance orientation and high expectations 92. Educational leadership 3. Consensus and cohesion among staff members 4. Quality of the curriculum/learning opportunities 5. School climate 6. Evaluative potential 7. Parental involvement 8. Feedback and reinforcement Schools use these factors as a reference; identifying issues and understanding how to "do better" (Palumbo, 2019) by self-evaluating in order to be able to design paths of improvement. An effective self-evaluation analysis requires indicators to achieve its ultimate goal; improvement. Following the introduction of the National Evaluation System, it became compulsory for schools to draw up strategic documents such as the Self-Evaluation Report (RAV), the Improvement Plan (PDM) and the Educational Offer Plan (PTOF). The self-evaluation phase is the principle of the entire process and it is fundamental to its success. The indicators are made available to the educational institutions and serve to provide elements of reflection in a self-evaluation key for the RAV. They include the following kinds of data: • data processed and returned by INVALSI to the school on the basis of its answers to the school questionnaire; • data taken from the administration itself and from the Sidi system • data from statistical sources (ISTAT, Ofiice of National Satistics, Home Office etc.); • data from the results of standard surveys on learning levels carried out by INVALSI; • possible reserve of data (indicators) proposed and processed by the school itself. The limitation of the RAV thus constructed, considering the primary external indicators, is the focussing on evaluation of these indicators and the difficulty of carrying out self-evaluation within the whole organisation and their investment in it. A shift of attention towards the schools and towards their ability to analyse processes is therefore necessary. The difficulties in implementing self-evaluation at school level needs to be found in the evaluation culture present in schools, in the socialised models of teachers' professional interpretation, in the relations between the school and the social stakeholders directly concerned. The indicators of the RAV cannot analyse the totality of the effectiveness factors and do not always succeed in promoting a collective self-diagnostic reflection in the school organisation. It is necessary to provide schools with tools that give them the possibility to: • have indicators that cover all the sub-components of the educational effectiveness factors; • involve all participants in the self-evaluation process; • promote shared and participative self-evaluation; The sub-components into which the components constituting the general factors promoting effectiveness are divided, can be analysed through the indicators of the RAV and their relative indices. All the indicators of the RAV find a place in the factors of effectiveness, with the exception of the indicators “1.2.a.1 Unemployment rate” and “1.2.b.1 Immigration rate”. These indicators should assist schools in the analysis of context and can be enriched by the analysis of the economic situation of the territory, using the territorial indicators for development policies present in the database of territorial indicators for development policies (ISTAT, 2021) The RAV indicators were not sufficient to analyse all the sub-components of the effectiveness factors: in particular it wasn’t possible to understand those related to leadership, school climate, evaluation potential, parental involvement and feedback and reinforcement. It's quite common for those aspects to remain unexplored and consequentely not used for a thorough self-analysis. Five forms were constructed in order to avoid that and to help the schools to analyse all the factors. The administered questionnaires were: 1. School Headmaster Questionnaire (23 filled forms each consisting of 29 questions) 2. Teacher Questionnaire (1342 filled forms each consisting of 33 questions) 3. ATA Staff Questionnaire (174 filled forms consisting of 14 questions each) 4. Primary and Secondary school students forms (864 filled forms consisting of 16 questions each) 4a. Sixth Form students forms (1217 filled forms consisting of 16 questions each) The forms 4 and 4a differ only in terminology, which is simplified in the case of cycle I. 5. Parents forms (1720 forms consisting of 1246 filled for the first grade and 474 for the second grade, each

with 18 questions) One or more questions in the forms are linked to a sub-component not 'covered' by an indicator in the RAV. The forms, together with a coincise explanation of the project, were sent to 142 schools of Cosenza province. The schools were divided into 4 areas, according to their grades. Out of the 142 schools contacted, 30 opted to participate in the study. This population was chosen because of its specific negative results in the standardised tests and lack of planning, both at school and network level, to integrate the RAV indicators. The schools administered the questionnaires in place of the "end-of-year satisfaction" questionnaires, citing that this was easier. The forms, filled with mostly structured and closed questions, were sent to schools from the end of April to the beginning of May. The 30 schools, that had opted to participate,, received the data from mid-June with a brief analysis accompanied by an outline of how the questionnaires had been constructed. All questions in all questionnaires received valid answers, the questionnaire tool via google forms allowed those interested to answer without difficulty. The questionnaires were completed by around 60% of the teachers and by 30% of the ATA staff. In the Secondary schools, students filled more questionaries than parents, while the opposite was true in primary schools. An initial analysis of the data showed: - The priority for schools is the wellbeing of pupils, followed by the quality of teaching and a positive school environment; - The Headteacher devotes most of the time to administrative-managerial-organisational activities, less to educational and pupil-related activities, it and provides support to staff, dispenses information, influences the internal setting. They consider self-evaluation positively but have difficulties in carrying it out in their school; - 65% of the teachers did not attend any courses on the National Evaluation System, 15% consider it a formality and cannot even comment on the design validity of their school's strategic documents; - Schools organise activities and make shared decisions with organisations, but collaboration is rarely described as productive; - All the participants (even the pupils) agree on the issue of behaviour management schools lack shared rules of behaviour for students to follow; - Pupils' satisfaction with teaching (94% cycle I, 80% cycle II), support received (91% cycle I, 75% cycle II), and participation in school decisions (54% cycle I, 38% cycle II) decrease in the education process; - Communication with the school is easy and takes place not only via the institutional website, the electronic register and communications sent home, but also via whatsapp chats and informal meetings; - Despite the fact that teachers discuss their pupils' achievements, 25% do not adjust their teaching, learning or instructional strategies; - For teachers, the study itself is important, even if it is not aimed at passing tests or examinations; - The most gifted pupils are not always enhanced (67% in I grade and 27% in high school). - 75% of the parents check the register at least once a week, for absences, homework assignments (grade I), grades in questions (high school) and report cards. - About 40% of teachers do not consider the extracurricular activities, carried out by their schools, useful - Teachers and ATAs recognise that the school promotes internal collaboration, but they would prefer to be supported by having better materials and methodologies available as well as more control of the school budget. Some schools shared the results at the last Teachers' Board Meeting in 2021/22 All schools will start to carefully analyse the data as soon as the commitments resulting from the examinations at the end of the first cycle and the second cycle are over. Schools will also use the new indicators together with those they will have available for the new RAV 2022/25. The collected data could be used not only for educational purposes, but also as a - Policy tool - Support for headteacher evaluation - Support for teacher evaluation.

Keywords: school self-evaluation, report evaluation indicators

The INVALSI training course towards the CPIAs for the system implementation of RAV: an example of reflective circularity between theory and practice

Michela Freddano - Daniela Torti

Starting from the next three-year period 2022-2025, also the Italian Provincial Centers for Adult Education (Italian acronym CPIA) are called upon to draw up their self-evaluation report (Italian acronym RAV) according to the Regulation on the Italian National Evaluation System of the school and training system (Presidential Decree 28 March 2013, n. 80). To this end, based on the mandate from the Ministry of Education, INVALSI designed an accompanying plan for CPIAs. That plan included an event to disseminate the main results from the INVALSI experimental study, which took place on 4 March 2021 and actively

involved the main stakeholders and experts of CPIA, and a training course aimed at CPIAs' principals and members of the internal evaluation teams (Italian acronym NIV). That training course had been carried out into the school year 2021/22 with the aim of increasing into the CPIAs practitioners the theoretical and practical mastery of the procedures and tools adopted for the self-evaluation of CPIA into the framework of the National Evaluation System. The training course was designed taking into account two aspects, one by will and the other one by necessity, respectively the active involvement of the participants in the training activities and the totally e-learning modality of the training course. On the one hand, INVALSI experimental study gave already the opportunity to promote the participation of the CPIAs and their stakeholders on the reflection and definition of the tools for the implementation of self-evaluation for CPIA. On the other hand, their implementation into the National Evaluation System requires to the users, in addition to an assumption of responsibility, the maturation of a certain degree of awareness of the self-evaluation processes, that goes beyond the formal accomplishment in order to be effective into the perspective of empowerment evaluation (Fetterman, 2002; Fetterman & Wandersman, 2007) and learning organization (Argyris & Schön, 1996). Within this frame, the training course had been characterized by a reflective circularity, that allowed researchers and practitioners come back to the theoretical dimension (from which we started) passing through the practical dimension. The practical dimension had been characterized by these training activities aimed to stimulating evaluative thinking (Buckley et al., 2015; Vo & Archibald, 2018) and to strength the data literacy for diagnostic and reflexive purposes (Mandinach & Honey, 2008; Mandinach & Gummer, 2013), individually and in groups. The training course involved 620 participants composed by CPIAs principals and members of the NIVs, for a total of 25 hours of synchronous and asynchronous activities. The Moodle open source platform had been used and assistance and tutoring had been provided. An initial questionnaire and a final questionnaire made possible to know the experiences and expectations of the participants and their satisfaction with the training course. Participants were able to experiment in a self-assessment test to verify the knowledge acquired during the course, at the end of which INVALSI returned formative feedbacks. Finally, through a specific direct consultation of the CPIAs, it was possible collect suggestions to improve the self-evaluation tools and procedures, some of which had been taken into consideration for the RAV definition for its system implementation. In this paper, after a description of the main training activities, we will focus on the results of the direct consultation of the CPIAs carried out at the end of the training course, aimed to receive useful elements to define the validity of self-assessment tools. Specifically, the communication sent by e-mail to the administrative office of the 131 CPIAs invited the principals and the members of NIVs to express their opinion regarding the CPIA Questionnaire, the RAV format, the online platform in which the RAV is hosted and all the other aspects related to self-evaluation. The CPIAs had the possibility to mail their observations and suggestions by filling in a specific form, individually or in groups. The consultation was voluntary and aimed at collecting the spontaneous observations of the participants in the training course. The phase of direct consultation of the CPIAs is crucial to match the theoretical dimension with the practical one of the RAV for the CPIAs, according to the hypothesis that direct participation, when it is aware and informed, is effective in decision making processes (De Blasio, 2014). Consulting directly CPIAs on tools and procedures for self-evaluation, at the end of the training process and after testing the platform of the RAV, can use knowledge and reflections gained on the self-evaluation process during the training. Therefore, suggestions for improvement are essential for the adjustment of the tools for self-evaluation before their implementation into the National Evaluation System. The CPIA consultation form has been made up of four questions with open answers. This modality was considered the most adequate to allow the members of NIVs to express freely their point of view in their preferred form and without influences. The optional nature of the activity led to obtaining 40 responses compared to 131 total CPIAs. The answers contained in the 40 documents received will be analyzed with a qualitative approach in order to identify strengths and weaknesses expressed by the members of NIVs on the following aspects: • structure of the CPIA Questionnaire; • RAV format; • articulation of National Evaluation System platform; • other aspects related to the self-evaluation procedures. The analysis methodology used provides a qualitative and interpretative approach to contents with an inductive method (Cole, 1988; Flick, 1998; Richards, 2005; Mayring, 2015; Creswell & Porth, 2016) with the technical support of the software MAXQDA2020. Starting from the entire textual corpus considered, in relation to the objectives of the analysis significant passages will be identified and the significant thematic units (codes) will be identified. Subsequently, each thematic unit will be assigned a label based on a coding based on open analysis grids (Miles & Huberman, 1984; Flick, 2002; Murray, 2008). After a careful reading of the identified labels and the extracts, the codes will be grouped into analytical categories according to the criteria of assimilation and similarity. The results will allow us to reflect on the validity of

the tools implemented for CPIAs self-evaluation, starting from the strengths and weaknesses expressed by the NIVs regarding the CPIA questionnaire, the RAV format, the National Evaluation System platform and other aspects related to the self-assessment procedure. The results will be represented through conceptual map that will highlight the elements deemed relevant by the participants, in order to start a discussion with the professional and scientific communities based on these evidences. In consideration of the recent establishment of CPIAs within the Italian education and training system and the complexity of this institution, it is necessary to give voice to the CPIA practitioners in order to consider the positive and negative aspects for undertake specific strategies aimed at consolidating and / or improving the self-evaluation tools and procedures.

Keywords: self-evaluation centers, adult education, qualitative research

Analysis of student needs and personalisation of learning: tools and strategies for self-Evaluation and instructional design

Sara Mori - Alessia Rosa - Jessica Niewint

In the context of studies on neurodiversity Armstrong (2012) underlines that there is a wide variety of cognitive functions against which the school is called to recognize. It's important to value the attitudes of each child trying to create a differentiated learning environment to safeguard everyone's right to educational success and to develop their potential. Miliband (2006) considers personalized learning as the solution to adapt learning according to the needs and previous experiences of individuals, in order to allow everyone to reach their potential (Lin et al., 2013; Hsieh & Chen, 2016). The analysis of the international literature has shown that personalized learning is a multi-layered construct (Schmid & Petko, 2019) with numerous definitions and various forms of implementation. Personalized education includes what is taught, how it is taught and the pace at which it is taught, thus managing to meet the individual needs, interests and circumstances of the students. Within the Italian report of self-assessment for schools (RAV, Rapporto di Autovalutazione), in the section "Didactic and educational practices", the area "Inclusion and differentiation" includes the topic "the Strategies adopted by the school for the promotion of inclusion processes and respect for diversity and the adaptation of teaching and learning to the training needs of each student in classroom work and in other educational situations "(INVALSI, 2017, p.29). This topic includes indicators like the activities aimed at inclusion, recovery and empowerment. INDIRE researchers are investigating the theme of personalizing educational activities with the goal of understanding what tools and methodologies the teachers use to understand the needs of students and enhance their potential. Already in previous projects such as PQM (PIano Quality and merit) the standardized tests were the starting elements for structuring courses of enhancement and recovery of mathematics and Italian (Mori et al, 2011; Meroni & Abbiati, 2016). This contribution describes the results of an open survey carried out by INDIRE researchers inviting teachers to identify the needs of students and implement useful strategies for personalizing the didactive activities. In this context the results will be discussed with two objectives. The first is to investigate how the indicators and descriptors of the RAV and the standardized tests can contribute reflecting on the analysis of students' needs. In fact, it is assumed that both the national tests and the RAV can be important elements of information to personalize the activities in class. The second is to initiate a discussion on how the descriptors relating to the area of differentiation can be enriched by the reflections reported also in other areas of the RAV inherent in the curriculum and methodologies. In this survey design was used a Mixed Methods approach (Creswell & Plano Clark, 2011) of an explanatory sequential type, characterized by an initial quantitative data collection allowing a starting set of data, which will be deepened using a qualitative survey. In order to achieve the first objective, the results of the answers to some open question of the administered questionnaire will be analysed to investigate the tools used by the teachers for the analysis of students' needs. Starting from the answers it will be possible to analyse which are the tools most used by teachers. For this purpose, this contribution will explore whether there are references to "standardized tests" or "indicators proposed by the RAV". Following there will be carried out interviews with some of the participants who have identified the potential in these two aspects to understand what are some peculiarities of the students with respect to personalization. In order to achieve

the second objective, the results of the questionnaire question will be analysed aimed at aggregating the personalization activities carried out in the classroom through labels: this will allow to identify some thematic nuclei useful to activate a reflection on which other guiding questions of other areas of the RAV can identify information for the personalization of the didactic activities. Actually, the data analysis is in the quantitative collection phase. From an initial preliminary analysis, 204 teachers belonging to the different school orders and grades answered the questionnaire. 22 teachers (6.6%) refer to the use of "standardized tests" to identify needs. However, what types of tests are referring to in the qualitative phase must be investigated. In answering the questions on the didactic activities to personalize teaching, most used labels are those of "peer tutoring" and the use of “digital technologies” in the classroom. These aspects within the RAV needed to be investigated more in context to the topic of "Learning environment". Especially taking note of the "organizational dimension" (for example: “How does the school use the technological equipment available?”) and the "methodological dimension" (for example: “What didactic methodologies are used by teachers?") This aspect can guide the reflection on how the rubrics of this area could be enriched by connecting with other guiding questions of other areas of the RAV. The RAV and national tests, are designed to describe the school on different levels of the organization.However, the use of these tools made available by the National Assessment System could also offer teachers the possibility of using them to obtain useful information at class level. A questionnaire administered online by the INDIRE researchers on the tools and methodologies useful for the personalisation of pathways does not, at first analysis, reveal explicit references to the assessment/self-assessment tools made available by the National Assessment System (SNV). This could also open a reflection on how the synergy with other aspects dealt with in the RAV in different areas of evaluation than that of "differentiation" can constitute useful elements for reflection. The terms of "personalization" and "differentiation" include different definitions in the various studies (Shemshak & Spector, 2020) and it may therefore be interesting to deepen the definition of these processes and the tools used in this very important area to report the educational process always closer to the unique reality of each student.

Keywords: personalization, RAV, analysis of students’ needs

Who are Italian preschool teachers? Provisional answers from data of the Italian national experimentation of the preschool self-evaluation report format

Cristina Stringher

Preschool quality matters for attending children and this is nowadays a largely shared concept within the scientific community and among policy makers (Love et al., 2003; Melhuish, 2011; Heckman et al., 2012; EU Commission, 2014; Morgan, 2019). This is also confirmed by the UN Sustainable Development Goals (UN SDGs, 2015). Less shared is a definition of quality in Early Childhood Education and Care (ECEC) services and preschools. Since decades, several scholars internationally debate on the concept of quality in ECEC (see: Vandell & Wolfe, 2000; Mooney, 2007; Montie et al., 2006; Mashburn et al., 2008; Halle et al., 2010; La Paro et al., 2012; Zellman & Karoly, 2012; Litjens, 2013; OECD, 2013; Moser et al., 2014; Slot et al., 2015; Bertram & Pascal, 2016; Pianta et al., 2016; Ansari & Pianta, 2018; Moss et al., 2000; Stringher & Cascella, 2020; Betancur et al., 2021). The editors of a recent special issue of an important international journal, however, conclude that there is still a long way to go in order to ensure we comprehend which quality experiences are important for children’s growth and how to measure them (Gordon & Farran, 2022). To respond to this key question, in 2014 the European Commission presented the European Quality Framework for ECEC, where it has identified five dimensions of quality: possibility of easy access to ECEC services and preschools; qualified, competent and sensitive staff; curricular guidelines and pedagogical dimension to support the holistic development of the child; monitoring and evaluation oriented towards the best interest of children; adequate finance and governance of the ECEC system (EU Commission, 2014). On this basis, a group of experts identified quality indicators for an ECEC system (EU Commission, 2018). In parallel, the OECD ECEC Network published several now classic works on quality in ECEC (OECD, 2015; 2017). On the wave of these studies, INVALSI started its own pathway towards the definition of quality in Italian preschool, also in order to establish a framework for preschool self-evaluation (Stringher, 2016a;

2016b; 2021). Within this work, it identified a series of factors that are closer to children and thus possess the highest potential to impact their well-being, development and learning. Among such factors: structural quality, process quality and quality of teachers' orientations (Harms et al., 1998; Sylva et al., 2003; Litjens, 2013; Anders, 2015). According to Anders (2015), structural quality concerns aspects such as the dimensions of classroom size (number of attending children), the children per teacher ratio, the level of formal instruction of teachers and staff, the quality of developmental materials and the dimension of the environment within an ECEC setting. These aspects are generally regulated by policy and by financial resources available. Process quality refers to the nature of pedagogical interactions among teachers and children, among children and between children and spaces or materials available in the learning environment, in addition to the interactions between teachers and parents. All factors that sustain the socio-emotional development of children. Process quality includes general aspects, such as appropriate behaviours of teachers towards children and of children towards their peers, as well as a positive classroom climate, enabling specific stimulations of children to support their verbal, logical-mathematical, cognitive and scientific development. Quality of teachers' orientations concerns their psycho-pedagogical and epistemological beliefs, the definition of their professional role, their educational values and attitudes towards the importance of children's experience fields. Quality of orientations includes also aspects pertaining the scholastic institution, such as the pedagogical approach of the ECEC setting, the idea of the child shared among leader and staff. With reference to the EU quality framework for ECEC, INVALSI decided to prioritize these dimensions, that in the EU framework refer to workforce, curriculum, monitoring and evaluation. This priority is given considering that these factors are malleable and thought to be directly under the control of a preschool. Preschool teachers are thus in a central position and constitute a key factor to adequately support children's growth. In Italy, however, we do not know about recent studies on this key figure of the preschool system. For this reason, the objective of this study is to shed light on the personal characteristics of preschool teachers and on their opinions concerning central questions relative to the quality of a preschool. These analyses are preliminary for further analyses on the determinants of teachers' perceptions children's outcomes that we intend to carry out in the future. During the national experimentation of the preschool self-evaluation report format (RAV Infanzia, in Italian), INVALSI collected data on the preschool contexts, on their structural quality, on process quality and on the quality of preschool teachers' orientations, as well as on children's competencies as perceived by their preschool teachers. Data were collected in the period 2019-2020 and derive from the school and teacher questionnaires administered to a probabilistic sample of 464 state, municipal preschools and preschools with equal state status participating in the national experimentation. An additional 1,364 self-candidate preschools joined the experimentation, for a total of 1,828 participating preschools. Within theser preschools, teacher questionnaires have been distributed to all teachers with at least one year of experience, for a total of 18,265 administrations. During the experimentation, three datasets have been produced: one for each questionnaire and one for the preschools self-evaluations carried out with RAV Infanzia online. The online platform has been duly prepared within the National Evaluation System (SNV, in Italian). The matrixes for the school questionnaire, teacher questionnaire and for preschool self-evaluation have been merged through a unique identification key, which was the code of the preschool participating in the experimentation. The study here presented is quantitative and descriptive. Currently, the analyses are under way on the questions of the teacher questionnaire that enable to respond to a series of research questions: • Which is the profile of Italian preschool teachers? • What is their teaching motivation and what are their future career aspirations? • Which practices declared by teachers are implementing the national preschool curriculum (Indicazioni Nazionali)? • Which factors do teachers consider for children's well-being and development? • What is the perceived school climate and what is the level of teachers' professional satisfaction? • What is their perceived self-efficacy? • Which practices concerning routine organization do teachers declare? • Which are teachers' declared practices to support children's inclusion and well-being? • Which evaluation tools do Italian preschool teachers declare to use? Data to respond to these questions are tabulated for teachers belonging to the sampled preschools, but analyses will be replicated on the total of in excess of 18.000 teachers, in order to investigate potential statistical differences between sampled and self-candidate preschools within the national experimentation. The analyses are currently under way and initial available results provide some characteristics of the profile of teachers operating within sampled preschools. A total of 4,726 teachers responded to the teacher questionnaire in these preschools. As one might expect, teachers are females for in excess of 99% of respondents in the sample preschools. This is possibly the highest proportion of females in all school levels. Their age is equal or higher than 46 years for approximately 75% of respondents. The presence of young teachers, up to 45

years of age, is thus a minority in the sampled preschools. This figure is confirmed also by the percentage of teachers with teaching experience higher than 15 years or more, equal to almost 70% in the sampled preschools, with 34% of teachers holding 26 years of experience or more. The experience accrued in the current preschool, on the contrary, is more limited: over 73% accrued up to 15 years of teaching experience in the current preschool, while almost 27% has between 16 and 36 years of experience in the same current institution. Initial teacher training for preschool teachers is at best at ISCED level 3 (secondary school) or post-secondary non tertiary for approximately 80% of the sample, probably also due to the age of respondents. These results are discussed in light of the available literature and future research perspectives are delineated, especially considering factors that teachers believe are determinants of children's outcomes.

Keywords: teachers, preschool, characteristics, self-evaluation descriptives

THEME 14. INTERNATIONAL LARGE-SCALE ASSESSMENTS (ILSAS) METHODS AND RESULTS

ORGANIZER: INVALSI

COORDINATOR: FALK BRESE

OCTOBER 28TH: 4.30 P.M. – 6.30 P.M. {ROOM 2 GIULIA – RESEARCH 12}

Immigrants and school achievement levels in Italy

Kalyan Kumar Kameshwara

According to World Immigration Report 2020, the scale of international migration and displacement has increased in recent years due to various reasons (McAuliffe et al., 2019). Some countries now accommodate large numbers of school-age immigrants in schools. School achievement of immigrant children differs widely across countries which might be caused by, among other factors, different immigration and education policies (Behr & Fugger, 2020). For example, in terms of PISA mathematics and reading achievement, first-generation immigrant students perform worse than students without an immigrant background in most countries (Schleicher, 2015; Agirdag & Vanlaar, 2018). Against this backdrop, I examine the achievement levels and likelihood of secondary school students with an immigration background in Italy. Early identification of a vulnerable group of students who are less likely to perform well is crucial for future socio-economic and political ramifications. This is because current lower achievement levels in school are associated with severe later life outcomes. It directly impacts human capital capabilities, employability, and civic and citizenship attitudes and outcomes among others. Therefore, its crucial to examine the differences between groups that might lead to prejudice and discrimination. They could be prevented by designing appropriate interventions such as affirmative action, and skill training programs that increase the human capital of the deprived sections. In this backdrop, I examine the following questions: • What are the trends in school achievement levels for students with an immigrant background in Italy? • Do the differences persist after accounting for various socio-economic and school characteristics that are likely to affect achievement? • Is the likelihood of performance impacted by the school performance? • How are the patterns when compared to other Anglophone countries? I analyse the latest Programme for International Student Assessment (PISA 2018) data, administered by the Organisation for Economic Co-Operation and Development (OECD, 2019b), where 15-year-old students across 79 countries are assessed on maths, science and reading performance. Additionally, PISA gathers a wide range of background information concerning students, parents, teachers, principals, and schools to gain some insights into how contextual characteristics influence student performance levels. PISA employs a two-stage stratified sampling strategy. In the first stage, schools are selected using a probability selection based on the number of students enrolled in the school. In the second stage, a sample of students are randomly selected within each selected school. Due to the stratified sampling process, hierarchical linear models are constructed to account for the nesting of students in respective schools. I construct several multi-level models to estimate achievement levels for first and second-generation immigrants compared to the third-plus generations. In addition, I include the probability weights to ensure the representativeness of our sample to the population. The results from random intercepts, random slopes, and cross-level interaction models are demonstrated after controlling for various student and school-level characteristics. I find that first-generation students (those who are born outside Italy) perform better than the third-plus generation (those whose parents are also born in Italy) students in maths and science. In the case of second-generation students (those who are born in Italy and their parents are born outside Italy), the likelihood of falling below the median score is significantly higher in maths and science compared to third-plus generation students. In the case of reading, it is not significantly lower compared to the third-plus generation. This could be because the second generation picks up the language as they grow up and hence improve their reading skills, relative to maths and science that demand additional efforts. Another interesting pattern that is observed is that the second-generation students who speak their mother tongue score significantly higher than others. These differences persist even after controlling for various individual and schooling factors. The immigration impact does not vary across schools in Italy meaning the performance of second-generation immigrants is equally poor across high/low performing schools. The effects (slopes) do not vary significantly across schools. This pattern is opposite to what is observed in the case of other Anglophone

countries such as Australia, New Zealand, and the USA. In the other countries, the odds of second-generation students achieving above the median score are higher than that of third-plus generation students. These opposite trends could be due to the immigration policies adopted by the other nations that filter candidates with only certain characteristics to emigrate to their respective countries. However, the findings are similar to the pattern observed in the UK. A few aspects are important to highlight corresponding to the potential inferences that might be drawn from the findings. The findings only show the mean effects and there could be potential heterogeneity that we do not observe between the association of immigrants and achievement their levels. The heterogeneity could be on the lines of ethnicity, or the time (year or decade) the respective individuals have migrated to Italy. Due to the lack of information on the above characteristics, we could not examine potential heterogeneity. We also cannot attribute any causal link between first or second-generation immigrants and their school performance. The causal effect could be because of any unobserved characteristic. My study further discusses the interpretation of the findings in the context of the diversity of immigration patterns across time periods and highlights some policy implications to bridge the inequality among immigrants and the third-plus generation populations.

Keywords: immigrants, PISA, mathematics, reading, science

Young People's views on Democracy in Europe and Latin America

Claes Ellen - Dimokritos Kavadias - Ernesto Treviño

Political socialization literature has focused on understanding the mechanisms and elements that promote an active citizenship with a clear focus on political as well as civic participation. Previous research has emphasized an apparent disengagement from formal politics by the younger generation in established democracies. Young people tend to be less involved in traditional forms of civic and political engagement (i.e., voting, membership in a party or civic organization) and tend to use less conventional media (i.e., journals or television to receive news). Recent studies however note that young people might be using alternative channels and forms of engagement, opened up by digital media. As a result, the democratic exercise has been strengthened instead of weakened. Authors like Foa and Mounk (2016) shed doubt on this interpretation. They point to the further possibility that the legitimacy of the democratic system itself might be at stake. Democracy might have been "the only game in town" in the late 1990's and early 2000's (see: Linz & Stepan, 1996), but that isn't the case any longer. Analyzing trends among different cohorts in the World Values study they conclude that we don't only see a change in participatory forms, but witness altogether a withdrawal from democratic institutions, and a rise of support for forms of authoritarianism in established democracies such as the US and Western-Europe (Foa & Mounk, 2016). With this article we will contribute to this debate by looking into young adolescents' views on democracy. In this article, we are assessing young people's differences in views on democracy by considering their scoring patterns via a latent class analysis (LCA) on good/bad democracy items in the ICCS 2016 study (an international study into civic and citizenship education of 14-year-old students). We do this for Europa (including Italy) and for Latin-America. We discuss differences and similarities based on countries' democratic characteristics. Research questions and hypotheses: We start from the premise that the way young people understand democracy is key to understand the future of democracy: Do young people support the ideas behind today's definition of democracy or do their views undermine democracy as it is defined today? Based on previous analysis on good citizenship profiles (Treviño et. al., 2021) we hypothesize that H1: Different profiles regarding views on democracy exist in early adolescence and that H2: These profiles have different participation patterns. Moreover, based on research related to differential effects regarding citizenship outcomes between young people with different socio-economic background and gender (Schulz et al., 2018) we hypothesize that these profiles are related to background characteristics (gender, SES). Next to this we know democracies develop on a different pace and have very different histories. We expect these histories to have an impact on how young people perceive democracy today and hence hypothesize that these profiles are related to countries histories. Data: This study draws on cross-sectional data from a representative sample of eight-grade students (14-year-old) (Schulz et al., 2018). We will use the data of the five Latin American countries (Chile, Mexico, Dominican Republic, Columbia and Peru) and the data of 14 European

countries (Belgium, Bulgaria, Croatia, Denmark, Estonia, Finland, Italy, Latvia, Lithuania, Malta, The Netherlands, Norway, Slovenia, Sweden) to investigate our hypotheses and to shed light on the research question if young people see democracy different as it is defined today and how these differences relate to individual and contextual characteristics. In our analyses we will focus on the position of Italy in our comparisons. We will mainly develop this study using the following question used in ICCS 2016: "Is the following good/ neither good or bad for democracy": 1) Political leaders give government jobs to their family members 2) One company or the government owns all newspapers in a country 3) People are allowed to criticize the government publicly 4) All adult citizens have the right to elect their political leaders 5) People can protest if they think a law is unfair 6) The government influences decisions by courts of justice. This question could be answered by good, neither good or bad, and bad. In order to investigate whether similar groups of students with similar scoring patterns can be identified in the sample, latent class analysis was applied to the seven indicator variables looking into good and bad democracy using Mplus 7.4 (Muthén & Muthén, 2017). In contrast to factor analysis (in which the aim is to identify interrelated items that describe a continuous latent variable), latent class analysis is a person-centered approach used to identify groups of individuals based on similarities in their item scores and estimate the conditional response probabilities for each item and latent class (Magidson & Vermunt, 2004). A series of models (on one country) with increasing numbers of class solutions (varying between one and five for this analysis) were fitted to the data. For model selection, we consider the most commonly used (Wang & Wang, 2012) goodness of fit indices for the LCA approach: AIC, BIC, ABIC, and the LMR LR, ALMR LR and BLRT tests. Smaller values of the AIC, BIC, ABIC indicate better model fit, suggesting that the model with the lowest value must be preferred. Significant values (e.g. $p<0.05$) of the LMR LR, ALMR LR and BLRT tests indicate a significant improvement in model fit as compared with a previous model. The values of the entropy criterion range from 0.0 to 1.0 with values closer to 1.0 indicating a better classification. Applying these criteria a 4 clusters solution was retained. Table 1 Comparison of different LCA models (N=2914) AIC BIC ABIC LMR LR ALMR LR BLRT Entropy test p-value test p-value test p-value 1-class 35591.729 35675.416 35630.933 - - - - 2-class 34733.097 34906.448 34814.305 0.0000 0.0000 0.0000 0.563 3-class 34469.155 34732.17 34592.366 0.0014 0.0015 0.0000 0.611 4-class 34373.792 34726.472 34539.007 0.6591 0.6612 0.0000 0.673 5-class 34305.808 34748.152 34513.027 0.1169 0.1178 0.0000 0.736 To facilitate the interpretation of the four latent classes we provide for each class the probability scale per item (Table 2). Table 2. Probability scale per item for four latent classes solution Latent Class LC1 LC2 LC3 LC4 ITEMS Categories Political leaders give government Good 42% 2% 23% 6% jobs to their family members +/- 48% 37% 51% 85% Bad 11% 61% 26% 8% One company or the government Good 28% 1% 14% 7% owns all newspapers in a country +/- 58% 23% 44% 89% Bad 14% 76% 42% 4% People are allowed to publicly Good 69% 64% 20% 6% criticise the government +/- 27% 35% 53% 94% Bad 3% 1% 27% 0% All adult citizens have the right Good 86% 97% 73% 13% to elect their political leaders +/- 11% 3% 22% 86% Bad 3% 0% 5% 2% People are able to protest Good 68% 59% 18% 11% if they think a law is unfair +/- 25% 38% 51% 88% Bad 7% 3% 31% 1% The police have right to hold Good 41% 13% 17% 5% people in jail without trial +/- 44% 45% 42% 95% Bad 15% 42% 40% 0% The government influences Good 48% 10% 14% 0% decisions by courts of justice +/- 45% 51% 70% 100% Bad 7% 39% 16% 0% Labels Monitorial Mainstream active Law Abiding Ademocratic Based on the configuration for each class on the perceived situations for democracy we labelled the classes respectively 'Monitorial', 'Main stream active', 'Law abiding' and 'Ademocratic'. A preliminary analysis already points to significant differences between the 'Monitorial', 'Main Stream Active', 'Law Abiding' and 'Ademocratic' classes, in degrees of knowledge concerning democratic politics. The tendencies to reject the principles of democratic politics are also related to aspects of civic education as perceived by the students. Each class differs in degrees of knowledge of democracy with the highest degree of knowledge in the class of the 'Mainstream active' pupils, while the 'Ademocratic' exhibited the lowest degree of knowledge as measured by the ICCS 2016 survey. Our analysis provides further evidence that there is no "one size fits all" approach to democratic citizens for Flemish secondary school pupils.

Keywords: views on democracy, latent class analysis

What do adolescents know about democratic systems: A comparative analysis among 24 countries

Catalina Miranda - Diego Carrasco - David Torres Irribarra - Ernesto Treviño

Political knowledge is a vital component for democratic systems, whose functioning is based on a citizenship that participates actively and in an informed manner (McAllister, 1998). Despite its relevance, there is no consensus on how to define or measure citizen knowledge (Lyons, 2017), being possible to measure political knowledge, civic knowledge, political interest, political attitudes, political sophistication or political awareness. Given this conceptual flexibility, the concern arises to analyze nine items on aspects that strengthen or weaken democracies to explore the political knowledge about democratic systems of adolescents in 24 countries in 2016. Prior to this work there are two studies that use this set of items with different conceptual framework, year of measurement and models of analysis. The first study by Husfeldt and Nikolova (2003) used CIVED 1999 data to measure political knowledge and political attitudes. They proposed three latent factors to shape responses ("rights and opportunities", "limited government" and "threats to democracy"), the number of items used was higher than in the present study. The second study is conducted by Quaranta (2019), who in comparison to Husfeldt and Nikolova (2003) proposes another analytical approach. From the conceptual point of view, he studies what democracy means to students and through a latent class analysis (person-centered) he reduces the 12 items (not the same as those available in ICCS 2016) present in ICCS 2009 according to interpretable patterns of responses. As a result, the author finds five profiles ("limited", "free speech", "minimalist", "complex" and "uncritical"). The present study continues with the measurement approach of Quaranta (2019), but defines the conceptual framework as conceptual political knowledge, i.e., these nine items provide us with information about what students know about democratic systems. Then, our question is: How are democratic profiles configured in 2016 for 24 countries? Will we find similar patterns to those exposed in Quaranta (2019)? Will it be possible to nurture theoretical conclusions from this conceptual framework? Our research hypothesis is that at least one model of three latent classes can be selected. To test this hypothesis we fit a structurally homogeneous model. This paper contributes to the literature on political knowledge in adolescents in two ways: i) it proposes an alternative way of measurement that can reinforce or complement previous results, ii) these results on conceptual political knowledge allow generating future research, for example, delving into gender differences in conceptual political knowledge. Data Data collected by the International Association for the Evaluation of Educational Achievement (IEA) in the ICCS 2016 survey (International Civic And Citizenship Education Study) are used for this study. This survey corresponds to a nationally representative, multi-stage, stratified randomized sample of 8th grade students (mean=13 years). ICCS 2016 involves 24 countries (Dominican Republic, Peru, Colombia, Mexico, Malta, Norway, Chile, Belgium (Flemish), Latvia, Russian Federation, Lithuania, Bulgaria, Korea, Republic of, Italy, Sweden, Hong Kong SAR, Estonia, Netherlands, Slovenia, Denmark, Croatia, Finland, North Rhine-Westphalia and Chinese Taipei), 94,000 students, 37,000 teachers and 3,800 schools (Schulz et al., 2011; Schulz et al., 2016). In order to measure students' political knowledge about democratic systems, nine items were used that listed the characteristics that strengthen or weaken a democracy. For each statement students could answer whether such a characteristic was good for democracy; neither bad nor good, or bad for democracy. To develop this objective, a structurally homogeneous latent class model is fitted. This model generates classes with the same expected response pattern in each country, so what varies is the proportion of observations in each class. Considering that different countries are being compared, another specification, a partially homogeneous model, is evaluated. This model allows the response patterns to vary by country. When estimating both, the specification of the structurally homogeneous model is chosen in order to prioritize the interpretability of the data. To determine the number of latent classes, we fit ten different models. For each model the country is entered as a fixed effect. That is country conditions the latent variable term only. We interpret the measures of overall fit, relative fit, and model interpretabilty. A first result is the selection of the latent class model, based on the fit criteria, the model with three latent classes is chosen (L2=20692.55, df=23925, p=1.00). In addition, this model presents a classification error of .18, which is the lowest classification error among all the fitted models with a satisfactory fit to the observed data (models with 3-10 latent classes). To establish a theoretical name for the three selected latent classes, we used the latent groups assigned by Quaranta (2019). Finally, the following classes are assigned: Minimalist (.36), Complex (.41) and Limited (.22). The minimalist class highly endorse the election of political leaders, the equal access to rights, and protest to unfair laws. However, is a less critical type, with less than 40% of endorsement for

criticizing the government, and lower rates to threats for democracy, such as media concentration, nepotism, the influence of courts of justice by the government and jailing people without trial. This class represent 36% of students. The limited class, present low rates across all proposed items, thus failing to identify good and bad situations for democracy. In contrast, the students in the complex latent category, identifies as good for democracy electing political leaders, access to equal rights, and protesting if a law is unfair. Simultaneously, this class also identify as bad for democracy news media concentration, nepotism in the government, and the influence of government over the justice system.

Keywords: democracy, adolescents, ICCS 2016, political knowledge

Improving student learning using large-scale assessments and Automatic Item Generation

Citlalli Sanchez-Alvarez

Computer-based assessments have seen a significant improvement in the last 20 years. They offer test developers an opportunity to use technology as an approach to measure complex constructs in more efficient ways, compared to traditional paper and pencil formats. Particularly, large-scale assessments (LSA) have transited to a computer-based approach that has opened the opportunity to create large data sets that can be shared and analyzed for different purposes, including comparative research (local, national, and international), educational monitoring and evaluation, policy and decision-making, and student learning improvement, to name a few. This presents an opportunity to collect system-level information about the quality and progress of educational processes, which in turn, has a key role in providing decision-makers with accurate tools for monitoring and improving educational systems. However, information produced from large-scale assessments seldom serves as feedback for educators, to help them get a better understanding of how their students are learning, what they are having more difficulty with, and how they can help them improve their learning process (Arregui & McLauchlan, 2008; Fischman et al. 2018; Volante et al., 2020). Recently, many countries have engaged in discussing new and innovative ways of redesigning their current assessments with the purpose of finding alternative ways to use large-scale assessment results in a more effective approach to improve student learning (Tobin et al., 2015). Most national and international large-scale educational assessments have been designed and developed under classical test theory and item response theory and follow a well-structured and detailed multi-stage methodological approach that will ensure an effective measure of the construct of interest. Different specialists, advisory groups, committees, and technical staff participate throughout the development process, and various procedures are implemented during each stage, such as the design of a general evaluation plan, framework development, instrument design, content definition and sampling, item and test development, test administration, scoring, item analysis, item banking and validity evidence collection. One key moment during this process is item development. Subject matter experts are responsible for creating single unit items from a test specification. After this, a field trial is needed to collect data, and through statistical analyses, any issues that affect the items' psychometric properties are detected and repaired to calibrate them, ensuring that they adhere to quality standards before they are assembled into a final version of the assessment instrument. A significant disadvantage to this approach is that it is not very efficient because it must be repeated continuously over time due to item overexposure, resulting in very high costs and a highly complex, arduous, and sometimes, inefficient process. During the last six decades, researchers have searched for item design and development alternatives that help reduce the high costs associated with this process. Computer science advancement and new developments in the field of measurement have led to an innovative approach to the design and development of a new research area that presents an alternative to test development and offers test developers the possibility to create innovative items in different formats (Sireci & Zenisky, 2006) that allow the measurement of a more complex set of competencies, abilities, and knowledge. This new approach is known as Automatic Item Generation (AIG), which is an emerging field of assessment that combines principles of test engineering, psychometrics, and cognitive theories, and integrates them into a comprehensive assessment development framework, used to create more efficient assessment instruments that assist in the process of overcoming some of the limitations associated with

traditional methods of instrument development. The objective of AIG is to produce large quantities of items through item modeling, where psychometric properties are pre-established and item development processes automated, with the purpose of instantly creating parallel versions of tests. This creates similar assessment experiences for the examinees within an assessment group without over-exposing the items and minimizing the test's security issues; thus, substantially reducing economic and time-consuming costs associated with assessment development (Bejar et al., 2003). Item models can be developed using two approaches: weak theory and strong theory. When weak theory is used, a parent item (Drasgow et al., 2006) is created by reviewing previously administered test items, picking one from an inventory of existing items, or by developing a completely new one (Gierl & Lai, 2012). This approach is used to generate isomorphic instances of the parent item (Bejar, 2012), which, if needed, can be altered by manipulating specific content-related elements. When strong theory is used to develop item models, efforts are directed toward revealing and mapping the cognitive mechanisms and skills that students use when solving the items, and toward stipulating the specific skills required to solve content-related tasks embedded in the items. By creating cognitive models, test developers have a strong basis for defining difficulty levels for the items (Gitomer & Bennett, 2002). The premise is that, by having strong theoretical support and knowledge of the cognitive demands of the content that the items are measuring, the parameters of a response model can be predicted and the item's psychometric properties, such as homogeneity and difficulty, can be controlled (Bejar, 1993). Due to the relevance of AIG for the field of LSA, this paper has two objectives: (a) to describe its basic principles, and discuss how they can be used in combination with cognitive theories, computer technology, and existing LSA frameworks to develop formative assessment tools that support educators and promote student learning; and (b) to present a methodological model for instrument development through AIG, and an item prototype developed through strong theory in a large-scale national assessment. Furthermore, a discussion about the implications for test developers, educators, and policymakers will be presented

Keywords: automatic item generation

THEME 7. THE COVID-19 PANDEMIC AND THE EFFECTS ON SCHOOL RESULTS

ORGANIZER: INVALSI

COORDINATOR: ANDRES SANDOVAL HERNÁNDEZ

OCTOBER 28TH: 4.30 P.M. – 6.30 P.M. {ROOM 3 LUDOVICA – RESEARCH 13}

Learning Loss and Students' Social Origins During the Covid-19 Pandemic in Italy

Nicola Bazoli - Loris Vergolini - Antonio Schizzerotto - Sonia Marzadro

During 2020 and 2021, in the attempt of limiting the diffusion of COVID-19, the governments of many countries decided to temporally close schools, suspend face-to-face teaching and substitute it by on-line learning. Quite obviously, most researches have focused attention on the possible effect of this phenomenon on student learning. It is possible to distinguish two branches of literature that analyse the phenomenon by considering the effect of school closure on (i) students' prior achievement levels and (ii) inequalities associated with social origin. With respect to variations in disparities associated with previous levels of student achievement, it must be stressed that, while several studies have found a decline in their intensity (Kuhfeld et al., 2020; Contini et al., 2021; Engzell et al., 2021; Spitzer & Musslick, 2021; Tomasik et al., 2021; Schult et al., 2022), others have observed: i) an opposite trend (Clark et al., 2020); ii) a mixed trend, with reduced inequality in one subject and increased inequality in another , (Borgonovi & Ferrara, 2022), and iii) even no variation (Depping et al., 2021; Gore et al., 2021). On the other hand, studies that have considered variations in inequalities associated with students' social origin have again yielded different results. The studies we have examined found, in a very similar proportion, either an increase (Engzell et al., 2021; Gore et al., 2021; Meeter et al., 2021; Sass & Goldring, 2021; Maldonado & De Witte, 2022) or, conversely, stable, and even reduced disparities (Kuhfeld et al., 2020; Birkelund et. al, 2021; Contini et al., 2021; Depping et al., 2021; Borgonovi & Ferrara, 2022). The main intention underlying this paper is to contribute to these topics and analyse the influence of the school closures due to the COVID-19 pandemic on learning loss in Italy; with focus on possible variations by student's social origins. More precisely, we would answer to a set of research questions. According to most national and foreign studies, do we find a significant overall loss of learning at the national level (Q1)? Because the length of school closures was different among different grade, are the losses vary according grades (Q2)? Do the losses vary according to the school subject (Q3)? Do significant variations occur according to students' social origin and socioeconomic background (Q4)? Social origin is not the only factor affecting inequalities of educational performance and opportunities in Italy. Therefore, do significant variations in learning loss occur according students' geographic area of residence, migrant status and high school track (Q5?) Data To test our research questions, we compared the scores in reading and mathematics recorded by the Italian National Institute for the Evaluation of Education System (INVALSI) among students attending grades five, eight and thirteen in the school year 2018/2019 to the corresponding scores of their counterparts enrolled in the same grades during the school year 2020/21. More precisely, in order to get information that was more reliable and less prone to cheating factors, we resorted to the scores collected by INVALSI among national random samples of school classes supervised by external observers during the test sessions. Our main focus is to study possible variations of learning loss according to students' social origin and socioeconomic background. INVALSI provides the ESCS (Economic, Social and Cultural Status) index to measure this dimension. Unfortunately, this index does not allow to identify specific social groups. To overcome this issue, we compared ESCS distributions to the distribution of an occupational scale developed in 1985 by De Lillo and Schizzerotto (DLS) derived from information based on data collected by the Italian Households Longitudinal Survey. Once it has been verified that the distributions overlap satisfactorily, we have identified 7 occupational macro-strata and we partitioned the ESCS distributions into seven intervals, sorted in ascending order, and assigned to each of them a width equal to the incidence of the corresponding macro stratum previously identified on the overall parental distribution of DLS scores. To estimate the effect of school closure on the level of learning in mathematics and in reading of the Italian students we have followed an approach was based on a before-after comparison. More precisely, we estimated the learning variations by comparing the scores achieved in the relevant test by fifth, eighth, and thirteenth graders in the school year 2020/21 (the treated group) with those arrived at by their counterparts attending the same grades in 2018/19 (the control group). Although the two cohorts are very close, we could not exclude the presence of compositional differences between them. To overcome this issue, we relied on a matching procedure that assured the equivalence

between treated and control group with regard to a set of observed characteristics. Specifically, we adopted on coarsened exact matching (CEM) (Blackwell et al., 2009) technique. The weights created by the CEM procedure are, then, included in the regression models specified for estimating the causal effect of the examined event, which, in our case, was the closing of schools during the COVID-19 pandemic. To estimate the impact of this occurrence on the school performances of Italian students, we specified two sets of models. The first set is intended to measure, for each school grade and for each subject, the overall learning loss. The second set of models measures the influence on possible variations in the intensity of learning loss exerted by: i) family social position; ii) geographic area of residence; iii) migration background and iv) the school track attended by thirteenth graders. The first set of models allows to answer the first three research questions, while the second set the research questions 4 and 5. According to most national and foreign studies, we found, with the exception of reading among fifth grade students, the school closure has generated impressive learning losses among the attendants of every school grade in both reading and mathematics test (Q1). In addition, the intensity of these reductions increases monotonically moving from primary to lower secondary to higher secondary school (Q2) and it is more pronounced in mathematics among fifth and eighth graders, while among thirteenth graders it is definitely higher in reading (Q3). Regarding the variations of learning loss according to social origin, leaving aside reading in primary school, students of every social origin have deeply suffered the negative effect of school closures in both tested subjects (Q4). However, the amount of their learning losses, whatever the grade and the subject, does not follow a linear trend moving from lower to higher occupational stratum. In other words, our data do not provide any sound evidence that the school closure has worsened the school performances of students from lower occupational strata more strongly than those of their counterparts from higher social conditions. Finally, we found similar results according to other factors of social inequality: no significant variations in learning loss regarding students' area of residence, their migrant status and the high school track they attended (Q5).

Keywords: learning loss, COVID-19, social origin

Predicting learning achievements in the COVID-19 era and before it: a two-cohorts retrospective study

Marta Desimoni - Michela Milioni - Donatella Papa

The ongoing pandemic of coronavirus disease 2019 (COVID-19) caused by the severe acute respiratory syndrome coronavirus 2 (SARS-COV-2), is posing many challenges to health, social life, economics, and education worldwide. With extended government-mandated closures of schools and other learning spaces affecting nearly all the world's student population, the global disruption to education caused by the COVID-19 pandemic is considered the worst education crisis on record (UNESCO, UNICEF, & WORLD BANK, 2021). Educational systems responded by offering remote learning opportunities for students, however, the quality and the effectiveness of such initiatives varied greatly (UNICEF, 2021). Also, the pandemic combined total and partial school closures with additional shocks, such as adverse health and economic impacts on the household (Moscoviz & Evans, 2022). Further, children and adolescents have been potentially highly exposed to biopsychosocial stressors generated by the pandemic response efforts, such as the lack of social gatherings, increased social isolation, and more. These stressors may impact various aspects of children's and adolescent's mental health, well-being (Crescentini et al., 2020; Spinelli et al., 2021; de Figueiredo et al., 2021), and learning (George et al., 2021), with possible negative consequences for students' academic achievements. Empirical evidence on the impact of COVID-19 on educational outcomes is only just emerging. First empirical studies showed an average learning loss and higher dropout rates in the COVID-19 era across countries (Moscoviz & Evans, 2022). However, about two-year after the COVID-19 outbreak, the effects of the COVID-19 pandemic on students' learning and academic achievements are far to be fully understood and more research is needed. In particular, recent literature (George et al., 2021; Moscoviz & Evans, 2022) suggests further exploring whether the COVID-19 worldwide pandemic exacerbates existing education-related inequalities and has stronger effects on low-achieving students. The present research aims to explore the eventual differences in the pattern of associations between previous school

achievements, sociodemographic characteristics, and educational outcomes at the end of secondary school across two cohorts: the cohort sitting INVALSI national assessment during the COVID-19 pandemic and the cohort sitting INVALSI national assessment about one year before the COVID-19 outbreak in Italy. This retrospective study was carried out by analyzing INVALSI data of two cohorts of grade 8 students (a COVID-19 cohort and a preCOVID-19 cohort) across two-time points each (T1-Grade 5 and T2-Grade 8), with the COVID-19 pandemic impacting the period between the two-time points for the COVID-19 cohort only. This design is unsuitable for inferring causal conclusions. However, it can provide some important insights into the eventual differences in the associations between predictors and educational outcomes between cohorts. In particular, we examined Mathematics (MAT8-T2) and Reading comprehension (ITA8-T2) ability estimates of Grade 8 students sitting the INVALSI national tests in the school years (s.y.) 2018/19 (preCOVID-19 cohort) and in the s.y. 2020/21 (COVID-19 cohort) and the retrospective data on Mathematics (MAT5-T1) and Reading comprehension (ITA5-T1) test performance that have been collected when students attended the last year of primary school (Grade 5). Noteworthy, MAT8-T2 (and ITA8-T2) estimates are directly comparable between cohorts because these are psychometrically linked on the same metrics. Sociodemographic variables were also considered in the study. From each cohort, we randomly sampled from the INVALSI national dataset 4,000 classes (level 2), for a total of 77,281 students (level 1). Statistical analyses were carried out through MPLUS statistical software in a multilevel approach. Grade 8 students from the COVID-19 cohort perform significantly worse in mathematics and reading comprehension than the pre-COVID-19 cohort, even when prior achievements and sociodemographic covariates are accounted for. Grade 5 performance significantly predicts Grade 8 outcomes, with significant autoregressive and cross-lagged paths in both cohorts. Students' SES, immigrant background, and gender significantly predict educational outcomes at grade 8. The gap between students from low-SES families and those from high-SES ones is larger in the COVID-19 cohort than in the pre-COVID-cohort, after controlling for prior achievement and other covariates. An analogous result emerges for students with an immigrant background (first-generation). Further, ceteris paribus students struggling more with mathematics and reading comprehension at the end of primary school are more at risk of subsequent low achievements at the end of secondary school in the COVID-19 cohort than before. Results on the differential effects of class characteristics on students' achievements between the two cohorts are also discussed

Keywords: COVID-19, mathematics, reading comprehension, inequalities, learning loss

The effect of Covid-19 school closure on students' achievement: The case of Italy

Alice Bertoletti - Marta Cannistrà - Mara Soncin - Tommaso Agasisti

The COVID-19 outbreak generated an unprecedented situation for all the educational systems in the world, forcing schools to close and deliver education remotely. Italy was the first Western country facing the emergency, with one of the longest school closures in Europe – from the end of February 2020 until the start of the new school year (September 2020). During this period, Italian schools had to drastically readapt their systems and teaching modality to a remote learning framework. This process has been particularly challenging for Italian schools, being less equipped to provide remote teaching compared to other European countries (OECD, 2018). For instance, in 2020, Italy reported one of the lowest Digital Economy and Society Index, ranking 25th among all 28 EU countries (European Commission, 2020). Similarly, TALIS data reveal that Italian teachers generally had little experience in the use of digital technology and digital learning at school (OECD, 2018). The length of the school closure and the characteristics of the educational system in the pre-pandemic period make Italy a relevant case to study. Nevertheless, there are only a few empirical contributions on the effect of COVID-19 school closure on the learning achievement of Italian students. Most of the literature focuses indeed on the Northern European countries, offering evidence only on the best case scenarios (these countries experienced shorter school closures and showed a high level of digital skills and resources also before the pandemic: Engzell et al., 2021). Besides, extant research is still lacking in providing evidence regarding the reasons behind differences in the learning loss (or gain) among schools. While empirical studies focus mainly on estimating the average effect of COVID-19 school closure on the standardised test scores (Engzell et al., 2021; Maldonado & De Witte, 2021; Hevia et al., 2021), the results

can significantly vary among schools (Engzell et al., 2021; Arenas and Gotazar, 2022) and subjects (Shult et al., 2022; Arenas & Gotazar, 2022). Even if this heterogeneity suggests that school-level and teacher-level characteristics could play a relevant role in mitigating the effect of the school closure, these channels remain still unexplored (Sternadel, 2021). Research questions: The present paper addresses these gaps by analysing the heterogeneity of the learning loss among Italian schools and providing separate results for grades (i.e., grades 5 and 8) and subjects (i.e., Reading, Mathematics, English). In particular, we examine the following research questions: 1. What is the extent of the learning loss for the Italian students due to the COVID-19 emergency? 2. How does learning loss vary among Italian schools? 3. How did different school characteristics and remote teaching practices influence the learning loss of Italian students? The data employed in the study come from two sources. During the first step of the empirical strategy, we used data from INVALSI database to estimate the learning loss of Italian students in the school-year 2020/21. In the second step, we match the learning loss computed in the first step with the information gathered through a questionnaire filled in by Italian teachers during the school-year 2019/20. The survey collection started in July 2020 and was concluded at the beginning of the new school year (September 2020). To guarantee comparability within grades, the questionnaires were sent out to grade 4 (primary school) and grade 7 (lower secondary school) teachers of reading, mathematics and English. In this way, we were able to monitor the performance of the same students through the INVALSI tests in 2021, in grades 5 and 8. Together with INVALSI, we selected a nationally representative sample of 856 schools across Italy. However, while we have complete data availability for the information in INVALSI database, the survey response rate ranges between 24% (grade 5) and 31% (grade 8) of the national sample. To calculate the average learning loss, we compare INVALSI scores of the COVID-19 cohort (treatment group) with the ones obtained by two pre-pandemic cohorts of students (control group) attending the same schools and classes. The variable of interest is, therefore, a dummy indicating if the student belongs to the COVID-19 cohort, or otherwise. The model has been estimated using propensity scores weights to balance the characteristics of the two groups of students. Moreover, interactions with the variable of interest with several student characteristics (e.g., gender, ESCS, nationality) allow us to explore the heterogeneity across groups of students. To obtain the school-level estimates of the effect of COVID-19 on academic achievement, we employ a multilevel (mixed) model, in which the variable of interest is allowed to vary across schools. Therefore, in the second step of the empirical work, we employ OLS regressions to examine the relationships between the school-level learning loss and some key characteristics of schools and the teaching practices during the school closure. All the estimates are provided separately per subject (reading, mathematics and English) and grade (grades 5 and 8). The results show a statistically significant learning loss in reading (-0.08 SD) and mathematics in grade 8 (0.180 SD) and in English in grade 5 (- 0.27 SD in English reading and -0.11 SD English listening). Students with high socioeconomic backgrounds were less affected by the COVID-19 school closure, while girls were particularly disadvantaged in mathematics achievement in grade 8 (with a 0.9 SD larger learning loss compared to boys). Also, compared to Italians, the effect of school closure on English test scores was particularly limited for foreign students. Nevertheless, the results of the multilevel model show a high between-school heterogeneity, especially in grade 5 - where the schools with higher INVALSI results in the years before the pandemic were the ones most affected by the school closure. Finally, the second-step estimates highlight that modality through which students were evaluated as well as a quick start of online classes and a high share of students' attendance are important factors explaining between-school variation.

Keywords: COVID-19, learning loss, academic achievement

THEME 3. SCHOOL AND INEQUALITY: CONTRAST AND REPRODUCTION

ORGANIZER: INVALSI - UNIVERSITY OF MILANO-BICOCCA

COORDINATOR: GIANLUCA ARGENTIN

OCTOBER 29TH: 9.30 A.M. – 11.30 A.M. {ROOM 1 ANNAMARIA – RESEARCH 14}

Effect of the class on low performing students

Angela Martini - Andrea Bendinelli

The term "context" when referring to schools can take on two meanings: in a first sense, the term indicates the "external context", that is the set of social and economic characteristics of the territory in which a school is located; in a second sense instead the term refers to the "internal context" and indicates the aggregate characteristics of the population of students attending a certain school, or, in other words the composition of a school intake (school mix). In the majority of the OECD countries, according to PISA international reports, regardless of their own socio-economic background, students attending schools in which the average socio-economic background is high tend to perform better than when they are enrolled in a school with a below-average socio-economic intake. Because of the "contextual effect", the effect on student performance of a school's or a class's average economic-social-cultural status far outweighs the effects of the individual student's socio-economic background. The same happens for the average competency level of a school's or a class's intake: the educational research about the effects on academic achievement of grouping pupils has unanimously found that the variability in learning levels is partly due to variance between pupils within schools or classes and partly to variance between schools or classes. For instance, a research carried out in France by Marie Duru-Bellat and Alain Mingat (1999) on the the progress of pupils during the first two years of college, corresponding to our lower secondary school, shows that: 1) The variables defining the context of a class (the average competency level at the entrance and the degree of heterogeneity) have a statistically significant impact on learning although less than individual students variables. 2) The average competency level of the class tends to have a positive effect on pupils' progress: the higher it is, the higher the effect. 3) Heterogeneity is also associated with a better progress but to a lesser extent. 4) The two previous variables interact with each other: pupils' progress is the lesser the more the level of the class is low and homogeneous, while in classes in which the average competency level is high heterogeneity has non longer any effect. Therefore it is in the low-level and homogeneous classes that weak students have less opportunities to progress. 5) A pupil's individual progress is influenced by his or her position within the class: weak pupils benefit from being placed in a class in which the average competency level is higher than their own, while strong students are disadvantaged from being placed in a class in which average competency level is lower than their own, even if the benefit of the former is double the disadvantage of the latter. Contextual effect is firstly and directly a peer effect. However the composition of a school's or a class's intake generates a series of indirect effects. For instance, teachers behave differently depending on the group of pupils they interact with, adapting their teaching methods and evaluation criteria to the class level, consciously or unconsciously. But many others aspects of a school's organization and general climate are influenced by the characteristics of its intake. In this regard the PISA 2006 international report (OECD, 2007, p. 195) underlines that «A number of studies have found that schools with a higher average socio-economic status among their student intake are likely to have: fewer disciplinary problems, better teacher-student relations, higher teacher morale, and a general school climate that is oriented towards higher performance. Such schools also often have a faster-paced curriculum. Talented and motivated teachers are more likely to be attracted to schools with higher socio-economic status and less likely to transfer to another school or to leave the profession». The presence of a contextual effect has implications for educational policies. If there is a contextual effect indeed the distribution of pupils among the units of the school system is a non-neutral operation. The equitable distribution of pupils among schools and classes is the best form of organization to guarantee equality of learning opportunities and should be adopted in compulsory education to counteract all factors, first that formally or informally can lead to an unequal distribution of pupils among schools and classes. Taking into account the above, in our work we analyze the results in 2019 INVALSI eighth grade tests to establish in the first place to what extent the total variance of the results is due to variance between schools, between classes within schools and between pupils within classes. Secondly we compare the results of two groups of pupils selected from the total student population who three years earlier, when they were in the last year of primary school, scored poorly

in INVALSI fifth grade tests. One of the two groups is composed by pupils enrolled in a class in which the average competency level of intake at the entrance to lower secondary school was high and the other group is composed by pupils enrolled in a class in which the average competency level was low. The hypothesis our research intends to test is whether pupils with the same competency level at the end of primary school perform differently in the third year of lower secondary school depending on the level of the class in which they were enrolled. Data used are the results in 2019 INVALSI tests of the students attending the third year of lower secondary school and the results of the same students in INVALSI tests when they were in the last year of primary school. What we expect to verify is to what extent the composition of a class affects the learning achievements of low performing students.

Keywords: comparative analysis, correlation alanalysis, multilevel regression, ordinary least square analysis

Educational poverty trap in Italian schools: the role of competences and socio-emotional skills

Emanuele Fedeli - Moris Triventi

The goal to improve the quality of the educational system has always been a relevant policy concern since schooling is a way to reduce inequality at birth and increase the social mobility of low-income families (Jenkins et al., 2003; Black et al., 2015). In principle, the educational systems should combine efficiency and equity to increase the participation of low-income students at overall levels of the academic route, such as primary, secondary, and tertiary ones. In this vein, many contributions unveil that low-income families are less likely to attend a tertiary program (Crawford, 2014) and, among many factors, the low achievement in secondary schools or the choice of not proper high school track explain the low participation in HE (Chowdry et al., 2013). Hence, it comes out of a vicious circle or an educational poverty trap before the HE and is rooted during mandatory schooling. Italy is an interesting case because socioeconomic origin and geographical residence characterize students' skills. Research goal This work unveils this educational poverty trap, investigating the association between the socioeconomic origin of the students and their outcomes, such as track choice and aspiration toward schooling. These outcomes are critical in drawing on the educational and labor trajectories (Blossfeld et al., 2016) but cannot describe the gap between low-high income students. In this perspective, we expand this kind of literature, considering other skills as mediating factors, such as the socio-emotional ones. Indeed, these skills play a vital role in promoting lifetime success, contributing to better working conditions, good health, and low criminal behavior (Heckman et al., 2006; Kautz et al., 2014; Conti et al., 2013), significantly when shaped at an early age (Almlund et al., 2011). Our research provides three main steps. The first one is to quantify the association between the socioeconomic origin of the students and their track choice and aspiration toward schooling. In the second step, we introduce skills such as competencies in numeracy and literacy and socio-emotional skills such as attitudes toward the subject, confidence, attitudes toward school, concentration, integration, and anxiety. Then, we use them as mediating factors to unveil plausible patterns behind the above-mentioned educational poverty trap. Finally, in the third step, we quantify and visualize this trap graphically for each Italian province to unmask a geographical divide. Data We use data from INVALSI-SNV, and we combine three starting cohorts in three school years (2011, 2012, and 2013) following 1 million students enrolled from the 5th grade of lower secondary, toward the 8th grade, to the 10th grade of upper secondary education. Our outcomes of interest are academic track choice and university aspirations measured in the 10th grade. As the primary variable, we use ESCS as social background indicator, a composite measure of socioeconomic resources at home. Then, we use many mediators collected before the academic track choices, namely in the 5th and 8th grades. We refer to the average scores in standardized tests in language and mathematics in the 8th grade to measure students' competencies, conceived as a proxy of their academic ability; the 8th-grade mid-term teachers' degrees in language and mathematics and final mark at the end of the 8th grade (lower secondary education) to capture teachers' evaluations; and socio-emotional skills such as attitudes toward the subject, confidence, attitudes toward school, concentration, integration, and anxiety, collected in the 5th grade To investigate the geographical variations in the reproduction of social inequalities in educational decisions,

which provide information on competencies and educational pathways across critical school grades for the whole population of students, we exploit the large size of INVALSI dataset. Indeed, we are in the position to disaggregate the analysis by provinces, thereby gaining a more fine-grained perspective on territorial heterogeneity in educational inequality. The empirical analyses follow two main steps. First, we use linear and nonlinear regression models to analyze how enrolment in the academy (academic track) affects social origin, students' competencies, and teachers' grades. Second, by using the KHB method (Karlson et al., 2012), we decompose the total effect of social origin on academic track enrolment and university aspirations according the abovementioned mediators. As additional checks, we adopt structural equational models and related mediation analysis. Preliminary findings suggest that (1) socioeconomic is positively associated with academic track choice and university aspirations; (2) socioeconomic origin accounts for 60% once standardized tests and socio-emotional skills are included; (3) a marked north-south and west-east divides came out. These findings are robust to checks regarding cheating in Italian schools. Moreover, the policy implications are salient since the policy maker has a complete overview of the link between socioeconomic origin and crucial outcomes such as academic track and university aspirations and its plausible and relevant mediators.

Keywords: skills, educational poverty

Varieties of Student Profiles and Teacher Assigned Grades. Non-cognitive Traits, Socioemotional Skills and Student Assessment

Ilaria Lievore

Teacher assigned grades are the most common measure of educational outcomes, and they have a central role in students' educational journey. Grades are signals used by students, parents, and schools indicating students' academic ability and possible educational future (Pattison et al., 2013). They are important predictors of a variety of educational outcomes, such as school dropping, track choices, scholarship gain and college admission and success (Bonesrønning, 2004; Blossfeld et al., 2016), as well as long-term outcomes such as future earnings and occupational choices (Lavy & Sand 2015; Bonner & Chen, 2019). Despite the centrality of teacher assessed grades in every educational system, a recent stream of research focusing on the issue of grading shows that teachers are like to give students belonging to different groups grades that systematically differ, but not due to their academic ability or performance (Protivínský & Münich, 2018). For example, students coming from more advantaged socioeconomic backgrounds are more likely to have higher grades, even when they have the same academic competence of the less advantaged counterpart. Different authors tried to understanding the channel through which these systematic differences in grades occur. On the one hand, economic research focused on disentangling the weight of teacher expectation bias and teacher stereotypes in grading practices associated with student ascriptive characteristics such as gender, ethnicity, and socioeconomic background (Bygren, 2020). On the other hand, psychological research focused instead on identifying the individual dimensions predicting teacher assigned grades, such as non-cognitive traits and socioemotional skills (Gerbino et al., 2018). This work aims at improving the understanding of what role the school system, and particularly teachers, plays in the reproduction of socioeconomic differences in educational attainment, considering different sources of grades inequalities among students with different gender, ethncity and socioeconomic backgrounds with similar academic competences. The goal is enlightening the interplay of different dimensions related to student grades, taking into account empirical research coming from different disciplines. Moreover, previous study on grade determinants failed in considering two factors altogether: 1) the nonrandom distribution across student population of non-cognitive skills, shaped by their socioeconomic background; and 2) the interdependence of the numerous non-cognitive skills predicting grades among each other. In this work, students' socioemotional skills, ascriptive characteristics and the interplay between them are considered altogether for assessing socioeconomic differences in teacher grades. Following the intuition that teachers cannot sensibly distinguish the single student's socioemotional skill from the interplay of the numerous factors influencing altogether student assessment, the interdependence of non-cognitive skills among each other is considered. Relying on psychological research, the starting point is exploiting students' non-cognitive skills

and socioemotional skills to partition students in comprehensive profiles where within-group differences are minimized on the basis of students' socioemotional skills distribution. This is exploited using Latent Class Analysis, that allows me to determine students' profiles for answering to the following research questions: i) Are students' gender, socioeconomic status and ethnic background significant predictors for students' belonging to different profiles? and ii) Are student profiles significant predictors for teacher assigned grades, even when accounting for student ability and ascriptive characteristics? In addition, relying on sociological and economic literature on grade determinants, the grade equation approach is adopted (see: Triventi, 2020; Hinnerich et al., 2011). The basic form of the grade equation model is a regression, in which a non-blind measure of student performance (teacher's grade) is expressed as a function of the variable identifying the group of interest plus a blind, unbiased measure of student ability, like standardized test score. Indeed, "noncognitive" skills are not captured by standardized tests (Jackson, 2018), and they may serve as a yardstick against which to assess differences in teacher assessed grades that are not explained by differences in students' academic ability. The empirical analysis relies on an original dataset that merges INVALSI Italian data with OECD-PISA data, that permits in-depth investigation regarding the issue of interest. INVALSI data contains information on student grades, academic ability and ascriptive characteristics. OECD-PISA data contains rich information on students' non-cognitive skills, attitudes, behaviours and psychological traits. The analytical sample includes 6,464 15-year-old Italian students in 2018. By relying on LASSO regression model first, and latent class analysis after, different student profiles are identified. By relying on multivariate logistic regression analysis, the stratification of students across the identified profiles is described, and finally the relationship between student profiles and teacher grade is assessed by relying on linear regression models that controls for students' ability and students' characteristics. The Italian upper-secondary school context is particularly suitable for this study, since socioeconomic differences in teacher assessed grades are particularly pronounced. Moreover, teachers have a particularly high degree of autonomy, making heterogeneity in grading favouritism related to student socioeconomic background likely to occur. Results indicate that Italian 15-year-old students can be partitioned in six profiles according to the within-group similarities in the distribution of non-cognitive skills, psychological traits, school related attitudes and social behaviours. Non-cognitive factors are not randomly distributed across the student sample, and some groups are more likely to display specific features and non-cognitive traits that may be highly rewarded in the educational context by their teachers, resulting in a systematic group advantage that adds up to, and partially confirm, the teacher expectation bias. Moreover, the fact that the relationship between student profiles and teacher grades is stable independently of students' characteristics suggests an effect of non-cognitive factors that goes beyond student ascriptive characteristics.

Keywords: teacher, grade, education, profiles, skills, stratification

THEME 5. THE USE OF INVALSI DATA AND MATERIAL TO IMPROVE TEACHING

ORGANIZER: INVALSI

COORDINATOR: CHIARA TAMANINI

OCTOBER 29TH: 9.30 A.M. – 11.30 A.M. {ROOM 2 GIULIA – TEACHING 1}

When gamification meets INVALSI questions

Ivan Graziani - Stefano Babini

Learning in mathematics is undoubtedly a long process over time and must be characterised by varied and meaningful experiences, above all our wish is that it be truly lasting and spendable in various situations and thus also competent. Also important are the methodologies used to teach at school, which can no longer be merely frontal, but must be diversified and, above all, for the most part active, as the National Indications for the first and second cycle, the Guidelines and the various documents produced by the Ministry in recent years have long suggested. If we want the teaching-learning process to bear its 'hoped-for' fruits, we cannot neglect these aspects, and that combination certainly cannot be broken, because there can be no real teaching if it does not lead to real learning in the students. In addition, it is crucial that the activities, which we want to propose to the classes, are truly challenging and that they interest the students, to involve them and make them feel truly at the centre of their learning process. We thought, as Lucio Lombardo Radice also suggested over forty years ago, of playing with mathematics, of gamification: "Why, to check what the students have learnt, don't you do an hour of games in class (instead of questioning)?" (Lombardo Radice, 1979). In classrooms, gaming is "considered a waste of time", or worse still, an activity only for young children, whereas it constitutes a "formidable means of communication" and is a "potentially highly effective teaching tool" (D'Amore, 2012) at all school levels. The term 'gamification', now also in use in our country, refers to the use of typical game elements in contexts outside the game (Deterding et al., 2011). This methodology has its origin in the computer world of video games, from which some principles of game mechanics are extracted, such as ownership (possessing scores, badges, prizes), achievement (passing trials, which can have different degrees of difficulty and be faced alone or in a group), status (level possessed by each player and visible to all members), collaborative communities and challenges (challenges, often timed, to be solved alone or in collaboration) (Vassileva, 2012). Therefore, it is not only a matter of proposing captivating and engaging activities for students, but of making the lesson itself part of a larger and more complex game, respecting its dynamics and mechanics, i.e. the player's needs on the one hand and the teaching requirements for the game to work well on the learning side (Werbach & Hunter, 2012). Indeed, gamification uses precisely game mechanisms to foster the acquisition of didactic concepts. We, therefore, thought of devising a game that used INVALSI questions to proceed along a numbered path. We created it and then tested it with our first- and second-cycle students. For the game, "Invalsiadi", in the school year 2018/19, we involved our students, from grade 3 and grade 2, Together with them, we thought, after looking at some famous board games, to create a board, made up of numbered hexagons of four different colours, on which we would proceed by throwing a six-sided dice in a path from start to end, in the manner typical of many board games. Together with our students, we also chose the colours of the squares and the difficulty levels attached to them. Four colours were chosen: red, grey, blue and white and also the indicative names associated with them: red-risk, grey-suspence, blue-opportunity and white-freedom. • The red hexagons, risk boxes, lead to medium-high difficulty invalid questions on the four domains; • The grey hexagons, suspense boxes, the questions will be of medium difficulty; • Blue hexagons, opportunity boxes, pose medium easy questions • The white hexagons, freedom boxes, allow you to pass without being asked questions. For the course of the game, when the pawn landed on one of the coloured squares, the relevant question was drawn and put to the student. If the correct answer was given, the student would proceed in the game, while an error would cause the players to stand still for a turn. The questions of different difficulties were selected by our students, under our supervision and with our advice, using the Gestinv 3.0 platform (www.gestinv.it), from among the tests released for grades 8, 10 and 13. For the difficult ones, questions were chosen from among those at level 4 or 5, or with correct answers below 40%. For the easy questions, students decided to select those at level 1 or 2, or with correct answers above 70%. For the medium questions, on the other hand, those at level 3 or with correct answers between 50 and 70 per cent were selected and chosen. In all, 50 questions were selected for each of the boxes and for both cycles of education. A total of 300 questions were then tested, through play, with both our students and

those from parallel classes. The purpose of this particular board game was to be able to tackle various topics and different areas of mathematics, testing the skills acquired by the students, through playful dynamics, without them being conditioned by stress, but trying to make them acquire the knowledge and skills necessary to accept and win the challenge. Another important aspect was that, in order to proceed in the game, the students had to answer correctly and always argue their answers, because the cards had to remain reusable and therefore could not be altered. To answer, they could use sheets to write down their answers and then explain how they had arrived at those solutions. The game was also particularly useful in making the invalid tests more 'familiar', getting the students used to tackling them, in a natural way, without resorting to drills in preparation for the tests. This has led our students to score significantly better on the tests than in previous years since we started playing and this was certainly one of the most important aspects of a fun educational activity for children like this.

Keywords: game, questions, levels of difficulty, learning

Exploring non-standard situations for sense-making in geometry from the perspective of a helical didactics

Francesca Ferrara - Giulia Ferrari - Ketty Savioli - Marina Gilardi

This contribution presents some results and reflections arisen from laboratory activities from kindergarten to grade 10: the inspiring elements of these activities have been, on the one hand, “Space and figures” items of the national assessment in grade 10 and, on the other, difficulties with geometric thinking underlined by the literature, such as the famous confusion between area and perimeter of a figure. The identification, the classification and the treatment of figures are important in mathematics because have to do with ways of organizing and structuring space and then of measuring it (involving ratios, tessellations, lengths, surfaces, and so on). As such, they are basic components of the development of geometric competence. The didactic practice plays a fundamental role in these processes: for example, length and area are both spatial, tangible, and accessible quantities, but there are no tools like rulers to measure area directly, therefore this needs other didactic methods. Research has also highlighted that for many students, the confusion between area and perimeter of even simple geometric figures, especially rectangles, indicates a poor understanding of both formulas for the calculation of area and perimeter (Smith & Barrett, 2017). Other researchers have pointed out that, when learning to measure area, difficulties with distinguishing the area of a region from the boundary of the region emerge, and this still occurs at lower secondary school (e.g., Chappell & Thompson, 1999; Tan-Sisman & Aksu, 2012). Descriptive language for these quantities (especially perimeter), such as “area is the inside and perimeter is the outside”, may also support this confusion (Clements & Sarama, 2009). Overall, compelling explanations or effective responses to these challenges have not been produced, therefore they require more accurate studies. Our work situates within this perspective, between research and didactic practice, thanks to the engagement of 75 teachers who took part in a training course we carried out in the school year 2021/22. In light of the above perspective, we have first adapted a close-constructed response item of the 2016 national assessment in grade 10 to previous grades. For this item, the correct answers were the 35,2% of the total, the missing answers were the 18,1%. The goal of the original item is to calculate the perimeter of a polygon C, which is portion of a square together with two other squares (named A and B), of which the measure of the area is known. To answer the item, it is necessary to identify the measure of the sides of the polygon, by connecting areas and perimeters of simple geometric figures (interestingly, a perimeter is required given two areas). Starting from this item, we have created didactic tasks for the development of geometric competences, which we shared in the training course from the perspective of a helical didactics. The proposed tasks are non-standard situations, which involve not the mere execution and repetition of knowledge but reasoning, problem solving and argumentation skills. In these situations, the process matters, not the product. Their key point is a very simple shape, the square, and its conceptual understanding (that, for example, involves perpendicularity and congruence, as member of the family of rectangles). Our hypothesis is that non-standard situations, such as the ones we have worked with, are ideal for focusing on the meaning making process and the didactic improvement in the classroom, as well as for promoting a positive view of assessment for learning

rather than of learning in ordinary practice. Used data The laboratory activities have engaged about 1600 students of the primary and secondary cycle (in two school districts of Piedmont). The teachers who carried out the activities were taking part to a training course we designed with the idea of working for and with mathematics teachers (the MATT&R Project) to enhance the material activity in mathematics, even in an inclusive view, and a mobile vision of mathematics and of the teacher, who observes, analyses, investigates, nourishes, and suggests in the classroom. The tasks focus on geometric thinking and its importance for the understanding of surrounding space and the mathematical modelling of reality since the early years, with the aim of helping learners to make sense of the complexity of their experiences in the world. Data we use are of different types: grade 10 items we discussed during the course and variations of them to adapt them to other grades, didactic tasks connected to the geometric thinking assessed by the national tests and to the role of non-standard situations in formative assessment, examples of resolution and argumentation processes by the students. The last type of data was available thanks to a logbook drawn up by each teacher, which traces the important aspects of each activity and includes concrete data and examples from the classrooms. The grade 10 items we consider concern the use of spatial relationships in certain contexts. Regarding these items, we have first examined how they have been varied for making them accessible at different grades or for introducing requests for explanation, and how students at different grades make mistakes. Then, we have collected examples of written productions from the classrooms where old and new non-standard situations, or other kinds of non-standard situations, have been experienced. Finally, we have carried out a qualitative analysis of these productions looking for similarities and differences but also identifying misconceptions or difficulties using the literature results. We have also taken into consideration the answers that the teachers of the training course gave to the questions on didactic choices, methodology and students' motivation. Our study wants to reflect on the geometric competence that is important to build at school, from kindergarten to upper secondary school, with respect to the difficulties highlighted by the literature and for which there are no convincing explanations. The need to think about the types of situations that can mobilize such a competence led us to shedding light on how argumentation and problem solving tasks, as well as tasks that are not merely procedural, executive and repetitive, or not habitual (as in the case of a given area and a requested perimeter), play a fundamental role. Finally, we have observed that some misconceptions or difficulties known from the literature arise regardless of school grade, thus revealing the didactic need for the development of a markedly conceptual knowledge. Therefore, non-standard situations, together with argumentation-oriented methodologies, are an essential resource of mathematics learning, in particular of geometric learning, and seem to reveal favourable convergences and alliances between standardized assessment and formative assessment.

Keywords: geometry, perimeter, area, problems, competence, assessment

Arguing is sweet to me in these items

Ivan Graziani - Chiara Saletti - Stefano Babini

At school, teachers and consequently the students themselves are usually unaccustomed to argumentation: there are many reasons for this unfamiliarity with an activity that represents a fundamental experience for the construction of knowledge and for metacognitive reflection on one's own learning processes. Learning represents the mental process through which new information is acquired. It is a dynamic structure that follows non-linear and non-sequential paths. Among the pathways that foster learning, one of the most effective is certainly that linked to the process of argumentation. Various aspects influence learning, including personal cognitive strategies (learning styles, experiences), the surrounding environment (stimuli and information from outside) and educational and communicative models (information, knowledge). It is therefore a very important process that requires time, a great deal of effort on the part of the teacher and the learner: arguing, explaining one's reasoning or strategies, giving explanations for the answers given or the procedure followed or any other aspect or concept that one can relate. These are certainly activities that cannot be improvised, but they must be introduced into teaching practice starting from pre-primary school and cultivated and developed in primary school in order to detect transversal competences, interweaving between disciplines, to make learning structured and permanent throughout

each student's educational journey (Baccaglini et al., 2018). It is unnecessary to emphasise the importance of argumentation as a central competence in didactics and mathematical activities and, more generally, as an important objective of the intellectual formation of the citizen. In the National Indications for the curriculum of the pre-school and first cycle of education it is said about argumentation that "in particular, mathematics gives tools for the scientific description of the world and for dealing with problems that are useful in everyday life; it contributes to developing the ability to communicate and discuss, to argue correctly, and to understand the views and arguments of others" (MIUR, 2012). One of the simplest ways of characterising argumentation is to start from the definition of 'argument' as 'reason given for the validity of a statement'. This can be a datum, an experience, reference to a shared theory, etc. Considering an argument as a discourse that coordinates several arguments in order to justify a statement, has led us in recent years to use INVALSI questions to encourage and facilitate the argumentation process among our students. This is even more evident when the questions are taken later in class with the students, with more time available and without the atavistic fear of making mistakes. In the words of the students who are arguing, it is possible to trace the learning as it takes shape, to keep track of all processes by evaluating them in their complexity but at the same time distinguishing them in a more analytical way. For our research and classroom work with the students, we chose items that required the students to argue about the process they were carrying out or we added this requirement to questions with unambiguous or multiple answers. The choice of items using Gestinv 3.0's research tools, we went for some medium easy items, with correct answers above 70% or level 1 or 2, grade 10 and 13 and some more complex ones grade 5 and 8. We then administered our dossiers to fifth grade primary, third grade secondary and second grade secondary students in some schools in the regions of Emilia-Romagna and Tuscany and analysed the answers given by the students. When we encountered answers that were not entirely clear, we had the opportunity to ask the students for further explanations, which allowed us to follow the process implemented in solving the proposed situation. The aim of our research was in fact to analyse the students' argumentative answers, assessing the similarities between the different school orders, but also analysing together with the students the different types of errors, linked to hasty readings (Zan, 2016), unconsolidated knowledge or misconceptions (D'Amore & Sbaragli, 2011) or to other different and peculiar aspects that emerged in the various cases. For our work in classrooms with students, we approached argumentation according to Toulmin's (1975) model, which consists of six basic elements: - CLAIM: which represent the utterance, the thesis. - DATA: which are the basic elements on which the argumentation is based. - WARRANT: which uses rules, definitions, analogies and justifies the connection between the DATA and the CLAIM. - BACKING: which presents further evidence, premises, lemmas and reinforces the Warrant. - MODAL QUALIFIER: which qualify theses by giving them a greater or lesser degree of force. "Probably", "necessarily", "perhaps", etc. (indicating that a claim must be accepted without restriction or with reservations). - REBUTTAL: expressing any conditions for which the Claim is no longer valid. A further aim of our research was to emphasise error, which is necessary for learning from the perspective of the motto 'by making mistakes we learn', by observing how the students were able to determine the real difficulties they encountered and how they organised their work to overcome them. The approach we adopted was that of the "pedagogy of error" in which this is experienced by the students as a possible risk when seeking new paths, when formulating hypotheses, when evaluating situations. Reflection on the causes of the error and its effects, the search for ways to overcome it and thus avoid it should replace the "sanction" of the error as the only outcome of the teacher's assessment process (Binanti, 2006). Above all, it is good that students understand that "in life there is nothing to fear, only to understand" (Hack, 2013) in mathematics and beyond, and that teachers should also start from this assumption.

Keywords: error analysis, questions, laboratory, verticality, argumentation

The INVALSI Tests seen by children, or what those who carried them out think

Marinapaola Mariano

Working on metacognition through INVALSI tests, discovering the perception that the students have of themselves through the tests they perform. The tests that the SNV sends to schools, are carried out by the real protagonists of the entire education system, by the pupils who, with the answers that they will provide, will offer the opportunity to analyze those processes of reflection and revision that will be started by comparing national data with those of all participating countries. Then there is the work carried out in schools that starts from the data returned by the SNV and goes to deepen and probe the answers provided by the individual classes and students. Based on these considerations, we asked the pupils, through the questions of a questionnaire, what idea they had about the tests and how they had carried them out. Self-reflection and personal motivation become educational tools that favor the development of a critical thought that re-elaborates what has been done and makes it an integral part of one's growth process, making the days dedicated to INVALSI trials important moments in one's academic career. When at school we talk about quality teaching, figures such as management and teachers are involved in building a path made up of educational actions that promote the achievement of the final goal, the educational success of the members, satisfying in fact the requests of the stakeholders targeted by the objective of the school process, which are the families. Tests that the SNV sends for their administration, are conceived by schools as an ordinary duty and by families as a commitment in which they collaborate, sometimes with anxiety as well as with participation. When the data received is returned to the stakeolders, the review process that has already been mentioned begins and which sees the teachers engaged in deepening, together with the class, the contents of the tests, especially where there have been more significant and widespread declines. If we also ask the children for their particular assessment of the tests carried out, the work becomes more complete and more heartfelt. We then decided to ask the main protagonists of this process what their thoughts were. Not out of simple curiosity, although enough to discover the appreciation of carrying out tests experienced by girls and boys as special checks. A true educational research and the didactic practices that follow cannot, and must not, disregard the main subjects of the educational action, the students precisely. That’s why is important to know their point of view; knowing what children think about, it helps to complete the picture of thinking that moves in innovation aiming at school improvement and helps to provide teachers with a further piece of the teaching practices implemented as a support to educational research. Data. To the students of the seven Second and seven classes Fifth of the two plexuses of the Primary School of our Comprehensive Institute of Milan which is part of the VIII Municipality who carried out INVALSI tests, and to the two Fourth classes, always belonging to the two plexuses of the Primary School that this year have carried out TIMSS test, for a total of about 360 students, was asked to answer an anonymous questionnaire that took into account only the gender distinction, consisting of seven single and multiple closed questions to help girls and boys to choose between the answers presented, the one that comes closest goes to their own thought. The questionnaire was administered about twenty days after INVALSI tests were performed and about a couple of months after TIMSS tests were performed. The questions aimed to discover the habits about the personal use of the computer, whether purely playful or in support of school activity; the ability and familiarity to carry out the tests on the paper file or on the computer; the personal perception of the degree of difficulty of the questions answered in the tests and the knowledge of the topics covered. In the case of these last questions, it will be interesting to compare these answers with the results INVALSI will return in September to see if there is a correlation between the safety or otherwise of her knowledgeof all the topics and having answered all the questions, and the real correctness of the answers provided. The structure of the questions was simple in order to assess better the answers. The language was very simple and suitable for the school level. The collection of information through the assessment of the questions, taking into account the diversity of measurement of the answers, will see a subsequent verification through a focus group, in the next school year, with the participating pupils. An exploratory investigation of the students' thought is certainly a good first step to undertake the path of building those good educational practices that contribute to outlining the path of quality teaching. Result. The expected result of the answers to these questionnaires is to provide a contribution to the different activities that take place at school to facilitate the promotion of metacognition in boys and girls. The ability to monitor and self-evaluate one's work by carrying out a backward path of observation and control of the answers given, of self-assessment regarding the perception of one's work and the answers actually provided by filling out the Test to arrive, at the end of the whole learning process, to the

achievement of one of the fundamental skills such as learn to learn, that is, to become fully aware of one's own limits and resources and throughself-reflection, an operational control of one's own learning and training path. Not to be underestimated, as the last aspect of the administration of this questionnaire, the curiosity stimulated to go beyond the things that are done at school as a school "duty", but to feel them as part of that path that leads each of them to be the protagonist of their own growth process.

Keywords: teaching practices, educational research, learning

THEME 12. Learning environments and student outcomes

ORGANIZER: INVALSI

COORDINATOR: RITA MARZOLI

OCTOBER 29TH: 9.30 A.M. – 11.30 A.M. {ROOM 3 LUDOVICA – TEACHING 2}

EDU@CTION VALLEY: synergistic educational ecosystem for an educating community

Caterina D'Alessio

"Don Lorenzo Milani" Didactic Direction of Giffoni Valle Piana, in the province of Salerno, users of about six hundred thirty pupils and includes four kindergarten and two primary school complexes. The social fabric in which the Institute operates is very diversified: alongside families attentive and actively participating in the school life of their children, economically and culturally weak families are characterized, which prove to be fragile in the approach to the educational function to which they are delegated . In order to respond adequately to the various family problems and to the continuous solicitations coming from the territory, the school is looking for increasingly attractive motivation for the pupils in order to engage them, even beyond school hours by proposing a varied, flexible training offer and articulated. The concept of a constructivist learning environment that implies each of our training courses is structured to accompany students in the processes of understanding through procedural and strategic orientations, meaningful, aggregating, inclusive, innovative learning. Each project proposal focuses on the planning of structured learning environments to favor the acquisition of twenty-first century skills by focusing on teaching based on skills, interdisciplinarity, laboratory teaching capable of guaranteeing training courses that respond to the personal inclinations of students in compliance with individual personalities and individual skills so that everyone feels recognized welcomed and valued. The structuring of a highly motivating learning environment cannot ignore the use of new information technologies in the classroom. For several years, our school has been offering digital training courses in Thinkering, experimentation with free, extremely engaging and collaborative Web Apps that promote the acquisition of key citizenship skills with particular reference to the digital skills provided for by Digcom 2.1,reference framework for citizens' digital skills. The methodologies implemented are: cooperative learning, learning by doing, peer to peer, peer correction, group work, which promote personalized coaching and scaffolding interventions, favor playful teaching, interactive lessons, flipped classroom, blended learning. Particularly, we focused on the methodology of gamification which acts on intrinsic motivation by stimulating cooperation, autonomy, European skills and social relations. The student outcomes proved to be very satisfactory both as regards the purely didactic sphere (acquisition and use of new digital technologies) and as regards the purely emotional and creative sphere, the refinement of the critical spirit, the improvement of self-esteem and sense of belonging to a group. With the two thousand and two thousand and twenty one School Plan, the territorial educational pacts appeared in the ministerial documents. The aim is to give birth to a new school model with broad participatory forms and with alliances that lead to the definition of a territorial plan of the educational offer, in which museums, libraries, the Third sector become partners of the school as an expanded training system, enhancing the local asset and the share capital of the territory. The territorial educational pact embodies one of the four scenarios that OECD identified for the school of the future at the end of two thousand and twenty: "that of the school as a learning hub, that is, an integrated and extensive training system". By expanding the spectrum of training offers, new possibilities are created for active, collaborative and welcoming teaching which, by intervening on educational poverty, becomes a tool against early school leaving and invests in the systematization of good practices to make innovation visible and easily replicable. Our school has promoted significant experiences of community pacts of a "local educational ecosystem of the Picentini", Edu @ ction Valley with the aim of building strong educational alliances in the area between schools, local authorities, families and third party associations sector for a widespread educating community. The intent is to promote a circular knowledge economy and strengthen the learning society for economic prosperity and social sustainability. Established as a territorial network between different actors, united in a broad and structured partnership to build effective practices and integrated actions for the territory ranging from planning to participation and the construction of innovative learning environments, Edu @ ction Valley, with civic center management Didactics Don Milani, has several partners: associations,

local institutions, the Proloco, the Musical Band Complex, the Oratory, the Scouts, the Soccorso Montano, the Municipality, the Giffoni Experience (Giffoni Film Festival, the film festival for children and teenagers that takes place every year in July) , the Order of Doctors of Salerno, some comprehensive institutes of the province of Salerno and the CPIA. It is a real local educational ecosystem set up in the heart of the Picentini with the aim of encouraging processes of inclusion, creating relationships between people, developing a collective identity and fighting educational poverty. Rebuild an educating village-community starting from the school, from the care of the educational spaces, from the use of technology and from the expansion of curricular and extracurricular training offer to involve and create a close and effective interconnection with families. The projects carried out and those in progress focus on the beauty of the territory, on food education, in collaboration with the reality of the third sector, concerning steam laboratories, the promotion of creative ateliers through ceramic workshops, creative recycling, realization and care by the pupils of an educational garden, enhancement of ancient crafts such as that of the basket maker, mathematics laboratories, gamification, outdoor learning activities, chess, astronomy and much more.

Keywords: learning environments, laboratories, information technologies

Laboratorium vs Auditorium

Sebastiana Fisicaro

This didactic research concerns the design of physical and digital learning environments in schools (Agenda 2030 goal n.4). The goal is to make schools more aware of the use of spaces (classrooms, corridors, courtyards, etc.) aimed at educational programming and to activate a monitoring and validation system to support learning and socialization. The physical space conditions the teaching action of the teachers, who know teaching methodologies and strategies but not the "use" of the physical spaces. Julia Atkin (Atkins et al., 2015) argues that the effectiveness of the physical environment for learning depends on the availability and possibility of choice, which students and teachers have in the use of spaces and on how it is possible to make the students choose what kind of space to use and how to use it. The design of spaces for learning stimulates a sense of belonging and allows them to be identified with their new environment "(Lippman, 2012b). The OECD already in 2013 analyzed learning spaces and processes, Learning Environments Evaluation Program (LEEP). The MPI in collaboration with Indire has addressed the issue of architectural choices from a didactic-pedagogical perspective (When space teaches, 2012). The OECD Group of National Expert (GNE) contributed to the development of the Learning Environments Evaluation Program (LEEP) with an international protocol to detect the impact of the different characteristics of the physical environment on learning and school well-being. the Interactive Classroom Working Group (ICWG), European Schoolnet with Indire, involved eight European countries to give guidance to schools on how to set up physical spaces and technological infrastructure. The object of this research is twofold, namely to investigate the role that the physical school space plays in the teaching planning of teachers and in a qualitative-quantitative way to design strategic interventions taking into account the spaces (physical and digital). The problem of detachment was also highlighted recently in the FUTURA Guidelines (PNRR 2022) "Designing, Building and Living the school", which focused on functional and flexible learning environments, also to respond to the pandemic, loss of learning and the constant increase in the lack of basic skills, 25% of pupils are below the minimum level of skills (Save The Children). In a post-COVID 19 situation, investigating the role of digital space, because it is less common for Italian teachers, becomes a prerequisite for targeted training interventions. For example, INVALSI 2021 tests highlighted the increase of students at lower levels in Italian and mathematics. OECD PISA assessed DAD and school difficulties, only 50% of teachers possess the technical and pedagogical skills needed to integrate digital devices into teaching vs OECD average of 65%, and 60% vs OECD average 68% is the time dedicated to preparing lessons, integrating digital devices, please note that the digital competence of students (European Digital Competence Framework for Citizens -DigComp 2.0) is an instrument of equity and reduction of the gap in the socio-economic context (INVALSI Report, 2022). Based on this premise, the investigation concerned: - detect the spaces (internal and external) for planning purposes; - detect students' processes in relation to spaces (physical and digital); - stimulate internal dialogue with focus groups (Weick, 1997); - improve the sense of belonging and the

organization of spaces (Lewin, 1935); - detect the close relationship between cognition and emotion) and students' school outcomes (James, 1980). Based on an initial survey in 2019, on a sample of 98 schools of all levels in the province of Messina, the data relating to the physical spaces of the schools, energy efficiency and redevelopment were collected. Over 90% of schools participated in the survey, 78.7% of the first cycle and 21.3% of the second. The data revealed that the school requalification interventions mainly concerned: installation of intelligent remote control systems for the regulation, management, monitoring and optimization of energy consumption (12.1%) and replacement of fixtures or refurbishment of existing works (26.3%), while only 27% took care of the organization of the spaces, the optimization practices, the usability of the spaces, with 19% on the optimization of the fields, rationalization of spaces or the clearing of premises. Furthermore, the data allow us to detect the design abilities of schools, in relation to energy efficiency, the attractiveness of school spaces, the compliance with the regulations of the sports facilities and equipment, 12.1% ROP for the redevelopment and 20% PON and POIN, with a total of about 32% of the schools interviewed. The disconnect between the organization of the school building, intended as a container, which requires some skills, and the use of spaces for teaching, is affected by the internal resources of schools, between those who have skills in environments and interventions (physical and digital spaces) and those who have skills in teaching/learning processes. Upon completion of the survey, in September, other data will be collected to analyze the correspondence between the innovative processes determined by the conscious use of the school and extra-curricular space and the outcomes of the students both for the physical space (innovative methodologies) and for the digital space (distance learning) intra-extra school. For the conduct of the survey, interviews and focus groups were carried out to compare the data of the first survey with INVALSI data, which will then be used to define a taxonomy of schools in terms of quality of the physical and digital environment and quantity of resources present (human and instrumental). The survey has already involved a macro sample (98 schools), from which a micro sample (about 35%) was extrapolated, identified for homogeneity on student learning outcomes and processes, creating a comparison with other data collected in the first survey (state of the building, design interventions, renovation of spaces, gyms and energy efficiency). Analyzing human resources, design skills on environments (physical and digital), the responsiveness of school managers to promote and facilitate innovation, the digital skills acquired by students, the availability of families, will serve to create a list of indicators to measure the efficiency of the integrated school system (knowledge of space and awareness of use). With focus groups we will study the open problems and possible solutions to the problems identified on: - Intervening on the physical and digital spaces of the school "Acting on the results" programming in an integrated way (innovative/digital environments). Three phases have been articulated: • data collection - Detection through structured questionnaires -Identification of problematic situations through focus groups with mixed groups (teachers/families/pupils) - detection of standardized test results in relation to learning environments tools: structured questionnaire, focus group, consultation of the RAV document • supervision - Formalization of data and reflection in a small group setting Tools: focus group on: Beyond the classroom, spaces as learning contexts - (Save the Children report data - Agnelli Foundation) • planning of change - Detect the active role of the pupil, the teacher, the school community and the "space" to make significant cultural and human experiences, develop various knowledge and develop the values of authenticity and openness to others (Jonnaert & Vander Borght, 2003; Rivoltella & Rossi, 2012). In general, schools are expected to develop integrated skills and a different way of understanding the physical and digital space, closely connected to an environment conducive to learning and not alien to it. In particular, we expect: to integrate the competences between those who plan the interventions for the school structure (building) and those who plan the didactic actions to improve the outcomes of the students. Reduce the disconnection of the systemic vision (school building and didactic planning). To develop a common and shared vocabulary and to correlate didactic planning and spaces. Qualitatively deepen the idea of creating laboratory teaching and active practice (Rocca, 2013), overcoming resistance to change. Develop the concept of a flexible classroom, rethinking the design as a building that is never complete, through its use, in a flexible way, in which the main structure remains fixed while the interior spaces can be remodeled, according to the changing context and educational needs. An existing building can be transformed into a high energy performance structure, the real challenge is to transform the existing park into high performance buildings (spacious classrooms, correctly sized and built with particular attention) and functional to teaching, learning environments and transformations/emergencies that the daily immanent presents.

Keywords: cultural axes, networks, innovative teaching practices

What learning environments for student competences in the 21st century?

Ornella Papa

The importance accorded to learning environments for the skills needed by students in the digital age is growing, together with an extensive evolution of the construct itself. The OECD (Organisation for Economic Co-operation and Development) considers a learning environment as "the result of interactions between physical resources (learning spaces, materials and technology), learners, educators, learning content, school leadership, society and policy" (Tanner & Lackney, 2006; OECD, 2008). A long-standing OECD work programme on Effective Learning Environments (ELE) collects case studies, explores innovative solutions for school structures, develops evaluation tools and promotes international policy dialogue. In this context, the Innovative Learning Environments Project (OECD ILE 2008-2014) involved more than 25 countries, including Italy, in a multi-year study on the innovation of learning environments (micro level) and strategies to implement change in an education system (macro level). The study was divided into three phases, the first one delved into the results of international research on learning (OECD, 2010), the second one analysed the innovative cases collected in the participating countries (OECD, 2013a); the third one proposed new ways to redesign the school as an innovative learning system (OECD, 2015). Currently, the OECD Learning Environments Evaluation Programme (OECD LEEP 2017-2022), to which Italy also participates, proposes tools to assess how learning environments can more effectively support didactics, pedagogy, curricula and organisations in developing the capacities of 21st century learners (OECD, 2017a). This paper examines and relates constructs, examples and tools analysing that have emerged from OECD studies, focusing on how learning environments - including educational spaces and different technologies - can lead to better learning outcomes, sociability and well-being for students (OECD, 2017b). INVALSI test survey 2020/21 showed that the results of Italian students, especially in secondary school, suffered a further decline during the period of the COVID-19 pandemic, making interventions to contrast educational poverty increasingly urgent. It seems particularly useful to provide evidence and insights to schools and policy makers for the renewal of learning environments in view of the interventions by the NRP (National Recovery and Resilience Plan) in educational field. Innovation in education, in fact, cannot be achieved through the diffusion of technologies if their potential is not fully leveraged in well-designed learning environments (Istance & Kools, 2013). At the national level, some actions for the enhancement and innovation of learning environments have already been promoted by the PNSD (National Digital School Plan), finding a privileged interlocutor in INDIRE (National Institute for Documentation, Innovation and Educational Research). Recently, as part of the INVALSI sest survey 2021/22, a section of the Principal's Questionnaire was dedicated to innovation and the digitalization process, which, together with the section on structures and infrastructures, opens the possibility of monitoring our topic of interest. Future developments of this exploratory and introductory paper include an analysis of the implementation and renewal of learning environments in the national school context. The subject of this contribution is learning environments, the educational role they play, the characteristics that make them innovative and effective, according to OECD studies. About effectiveness, reference is to the ability to contribute to the appropriate development of the skills needed by students in the digital age. The concept of 'innovative' implies certainly rethinking spaces and infrastructures, increasing technological and digital resources, using new teaching methodologies such as technology-enhanced learning. However - from a holistic and systemic perspective - the renewal proposed by the ILE Project concerns the entire educational setting, the set of conditions and dynamics that contribute to learning as an active and social process, according to the constructivist matrix. Therefore, specific modes of relationships are strongly supported, such as collaboration between peers and between the different actors in the educational process. The involvement of different partners at various levels appears necessary for "learning leadership" to which is recognised particular importance for its active role in the design, implementation and sustainability of learning environments (OECD, 2013b). The framework, good practices and conclusions of the ILE Project are complemented by the proposals of the LEEP Programme for the evaluation of the quality of learning environments and their role in the renewal of the educational setting. The purpose of this work is to provide examples, tools analysing and guidance for implementing learning environments in the Italian school context that, in the light of evidence, facilitate the development of 21st century competences and school outcomes. Data This contribution considers data from the OECD ILE Project, with reference to the case studies analysed during the second phase of the Project and particularly to the 40 good practices identified 2 of which were selected in the Italian school context. The data are set out in the framework and methodology used to collect and select the case studies. The analysis

tools proposed in the current OECD LEEP Programme to assess the quality of learning environments are also presented. The contribution examines evidence and proposals emerging from international studies on learning environments conducted by the OECD. The examples of good practices - collected during the second phase of the ILE Project - and the survey instruments proposed within the LEEP Programme are presented analytically. The examples, the questionnaires and characteristics identified in innovative and effective learning environments are used to create a guide that facilitates the configuration of educational settings adapted to the transformations of the 21st century. The evidence reported, which represents an authoritative reference point on the subject at international level, supports the hypothesis that the presence of adequate learning environments contributes to the effectiveness of teaching and the development of the skills needed in the 21st century. The results of these in-depth studies are used to create guidelines that can support policy makers, school leaders, teachers, in the design and implementation of adequate learning environments.

Keywords: learning, environments, innovation, student, competences

THEME 5. THE USE OF INVALSI DATA AND MATERIAL TO IMPROVE TEACHING
THEME 13. SELF-EVALUATION REPORT (RAV) AND INVALSI DATA FOR THE SELF-EVALUATION OF ITALIAN SCHOOLS

ORGANIZER: INVALSI

COORDINATOR: NICOLA CHIRIANO

OCTOBER 29TH: 2.00 P.M. – 4.00 P.M. {ROOM 2 GIULIA – TEACHING 3}

Intertwining formative and standardized assessment: the didactic and cognitive relevance of non-standard situations from primary to secondary cycle

Ketty Savioli - Francesca Ferrara - Giulia Ferrari

In this work, we want to offer a reflection on the role of the so-called non-standard situations in mathematics teaching and learning, according to a vision of assessment "for" learning rather than of learning. While the latter has a more "quantitative" and measuring core, assessment for learning aims at "qualifying" learning manifestations to provide students with precise indications about their strengths and criticism, therefore their growth. The document: "Nuovo quadro normativo in merito a valutazione, certificazione delle competenze ed esame di stato", which refers to the legislation n. 62/2017, states as follows regarding the object and goals of assessment (art. 1): "Assessment has the formative process and the results of learners, of the students of the school institutions of the national system of instruction and training, as its object, has formative and educational goals and contributes to the improvement of learning and the students' formative success, documents the development of personal identity and promotes the self-assessment of everyone in regard to knowledge, skills and competences acquisition". The Italian University and Research Ministry note n. 312/2018 has introduced guidelines for the competence certification in the primary cycle. The document brings about the importance of the construct of competence overcoming a vision of learning as mere knowledge acquisition. It is instead necessary to establish relationships between acquired knowledge and the world for finding solutions to everyday problems of real life. The certification also plays a role in being oriented to the following cycle. Finally, the ministerial decree 172/2020 "Valutazione periodica e finale degli alunni e delle alunne della scuola primaria" (that evokes the perspective of the legislation n. 62/2017) has marked an even more pronounced change, restating the fundamental formative and educational value of assessment and introducing the guidelines to carry out assessment in the primary cycle. The document underlines the circular and recursive character of assessment design and processes, in line with the "Indicazioni Nazionali per il curriculum" in the primary cycle (MIUR, 2012), which shed light on its function of "accompanying the learning process and stimulating continuous improvement". The assessment therefore has the sense of the latin verb "valére", participle of "vàlitus", which means to be strong, healthy, solid, to have value. To assess therefore is "to give value", "to valorize": the assessment is dynamic and "precedes, accompanies, follows", it allows to adapt teaching to the concrete educational needs of students and their learning styles, it acts both at a cognitive and metacognitive level. The change is profound and implies a real culture of assessment, which becomes an essential dimension of the teaching and learning process, acquiring value not only for its summative role (the traditional vision) but for its formative role, as well as a quality factor for the teacher action. It is an assessment that accompanies underway, not focused on the result but on the cognitive development of the student and can activate change and improvement. Our reflection is part of this institutional viewpoint over mathematics teaching and learning and the connected role of standardized and formative assessment. Turning to an international perspective, we can see that the 2019 TIMSS tests (in grade 4 and 8) take into consideration three cognitive dimensions: Knowing, Applying and Reasoning. They respectively concern: knowing facts, concepts and procedures; applying notions and conceptual knowledge to solve problems or answer questions; understanding new or non-familiar situations, complex contexts and problems that require several passages. In the tests, the items related to the three dimensions are: the 40%, 40% and 20% of the total in grade 4; the 35%, 40% and 25% in grade 8. The weight of the dimensions emphasizes the relevance of "high" processes, which however must not be sporadic episodes but crucial and constant passages of teaching. The reasoning dimension brings situations that overcome the mere solution of routine problems in the assessment. Non-routine situations are also one of the four dimensions of the periodic and annual formative assessment of the 2020 guidelines, an essential aspect of the assessment process, together

with autonomy, resources and continuity. The guidelines precisely highlight the difference between known and non-standard situations. While a known situation (or activity, task) can be the one that is already presented from the teacher as an example or proposed again many times in similar ways to face executive exercises and tasks, a non-standard situation is new for the students, introduced for the first time in that manner and without specific indications with respect to the kind of procedure to use. In mathematics, open and articulate, non-standard problems, with a non-procedural or non-operative nature, which encourage reasoning and argumentation and focus on conceptual or relational aspects (related to meanings and the semantic dimension) are examples of non-standard situations. Non-standard, non-recursive situations are the object of our study: they must be intended not as "unknown" situations but mainly as occasions which mobilize learning oriented to communication, reflection and argumentation skills. Mathematics education research continues to underline the importance of conceptual understanding, not limited to mechanisms and rule or procedure applications (Sfard, 1991; Richland et al., 2012; Rittle-Johnson et al., 2015; Gravemeijer et al., 2017). The conceptual and procedural distinction evokes the one between conceptual tasks and routine tasks (Cohen, 1999), with the second tasks requiring a "high" demand at different levels (cognitive, metacognitive, emotional, motivational). Research on assessment has pointed out the increasing importance of higher order thinking in the 21st century, which is essentially process-, reasoning- and problem solving-oriented instead of product-, calculation- and skills-oriented (Hoogland & Tout, 2018). Our hypothesis is that a didactic practice (also) based on non-standard situations, while is more articulate, allows to work on the comparison of reasonings, the evaluation of strategies by means of collective discussions, the overcoming of errors and the possibility to analyse non-dychotomous answers (of the right/wrong type) but answers involving the typical nuances of sense-making, developing awareness and autonomy and working in a crosswise manner. Used data Data we consider in our study are some items of the national assessment tests administered in different grades, mainly in grades 5 and 10. We first focus on the characteristics of these items, both regarding their characteristic curve and answer distribution (data from INVALSI) and their nature of routine or non-familiar problems (according to our analysis). We then examine the written answers provided to these items in different situations: in the field trial of the national assessment or in the classroom context, where the item formulation has been varied or a request added, such as: "Explain what you did to find the answer", so as to "push towards non-standard situations" (data from our laboratory activities). The method we use is based on a qualitative analysis of the national assessment items (aspect, formulation, type, purpose, the way of functioning and, also, the nature of known or non-standard situation) and of the written protocols of the students' answers at the different grades. The second kind of material allows to investigate various information: the incorrect responses, the procedures followed, the solution strategies developed (sometimes unexpectedly), all of which speak directly to the cognitive processes mobilized by the items. Our analysis highlights the didactic and cognitive role of non-standard situations for the development of mathematical competences, not only for the primary cycle but for the entire education cycle. In some cases, we show that primary and secondary school students tend to follow similar paths to incorrect answers, mainly proceeding in a procedural way and without activating explorative strategies (cognitive dimension). In other cases, we show how students in a certain grade give incorrect answers less to routine tasks than to non-standard tasks, pointing out the relevance of using non-familiar situations in mathematics (didactic dimension).

Keywords: mathematics, problem, routine conceptual cognitive, assessment

A passport to high school? The INVALSI skills certification and the teaching potential of grade 8 italian test examples

Antonella Mastrogiovanni - Luca Pieroni - Antonella Vendramin - Francesca Rita Resio

The computer-based administration of INVALSI tests in the various secondary school grades has enabled considerable improvements from the point of view of testing, one of the most important being the possibility of assigning an individual level of competence to the individual student in grades 8 and 13. In fact, the construct of "text comprehension" has in itself a complex nature as it contains several different dimensions studied by both linguistic and psychological fields of study (see: Reference Framework of Invalsi

Italian Test; PISA report "21st-Century Readers Developing Literacy Skills in a Digital World"; NAEP Reading Assessment Framework; Lumbelli “La comprensione come problema. Il punto di vista cognitive”). It is therefore sometimes complex to go on to show concretely what is meant in the certification of competences by concepts such as information retrieval skills, lexical competence, morphosyntactic competences, the ability to reconstruct anaphoric chains, the ability to relate implicit and explicit information, the ability to evaluate the structure and form of a text, competences in stylistic choices, rhetorical figures and the interpretation of argumentative strategies implemented by the author. In order to meet this need for clarification, INVALSI has prepared a number of test examples (text with associated questions) which have already been published for grade 13 and are in the process of being published for grade 8. These examples have the task of putting in parallel the descriptors of the competences, distributed across the various levels of difficulty, with examples of questions and texts modelled on those present within the item bank; clearly all within the framework of the National Indications. This operation of creating examples is based on a qualitative analysis of the characteristics of the texts and questions present within the question banks in order to identify 'equivalent' exemplifications of these materials. The tests that make up the question banks must, in fact, necessarily remain secret over time, even though they have been partially renewed and increased over the years. With respect to the formulation of the questions, moreover, the qualitative analysis necessarily entails the in-depth study of all those elements that determine the difficulty of that specific question so that the process of attributing it to a specific level is founded on assumptions that also take into account the empirical data derived from the pretests and the various administrations that have taken place over the years. Finally, the review of all these materials by a group of external experts enabled the necessary validation of the proposed materials. This combination of different approaches and expertise is intended to be functional in giving the final product a reliable scientific rigour necessary for the use of these materials in both the research and teaching fields. Through these tools, it is possible to better understand how each text comprehension task that the student carries out while confronted with INVALSI test has been declined on a scale of difficulty based on the textual circumstances in which the task is carried out. The exemplification of the text comprehension tasks proposed by INVALSI in the tests helps to clarify more immediately what the elements of ease and difficulty are within the various descriptive levels of competence and above all to see concretely what the various passages of the descriptions of the levels themselves refer to, which often present a lexicon that must take into account the various ways of describing the same linguistic or psycholinguistic phenomenon. Starting from the accompanying tools produced by INVALSI on the text comprehension tests, specifically the tools produced and currently being published for grade 8, suggest possible uses of the same not only for clarifying the contents of the tests themselves, but also for implementing targeted teaching actions aimed at improving this key competence. The presentation will focus on the study and analysis operations that INVALSI has implemented in general for the production of these examples (grade 8, grade 10, and grade 13) with the aim of showing the complexity of the actions necessary to make the bank of questions on which INVALSI test is based transparent in terms of content and consequently the elements described within the levels of competence more precise. This process will lead to reflections on the didactic potential of the accompanying instruments of INVALSI Italian test, going to explore in particular and closely what has been achieved for the grade 8 test. The test examples, in fact, can provide, together with other instruments that integrate the assessment of text comprehension with other elements linked to the same competence but not measurable by the standardised test, a cue for the activation of a series of good teaching practices. Indeed, it may be assumed that the more the construct of text comprehension is clarified, in its various components and in the scale of complexity of each individual component, the more effective targeted teaching action by the teacher will be. The focus of this work will therefore be on the informative potential that the certification of Grade 8 Italian competences issued by INVALSI, thanks to its "strategic" position straddling the two school cycles, can have for the Grade 9 teacher. Starting from the certification of competences obtained by students from different schools in the previous school year, they can immediately get an idea of the reading competences of these new students. Then, by using the accompanying materials produced by INVALSI for a greater clarification of the contents and thus of the tasks proposed by the tests, the teacher will be able to direct teaching action in a more targeted manner towards remedial paths for the elements of text comprehension that require greater in-depth study, both at the level of the class group and at the level of the individual, where there is a greater need for intervention.

Keywords: education, reading, comprehension, skills, certification

Which arithmetic competence at the end of primary school (and beyond)?

Stefania Pozio - Francesca Ferrara - Ketty Savioli

Mathematics education research has widely shown that the correct performance of arithmetical operations and the mere learning of procedures should not be the sole focus of arithmetic teaching and learning. Rather, it is necessary the knowledge of when to use an operation, but also the awareness of key aspects of number, such as ordinality (Sinclair & Coles, 2017) and cardinality (Sarnecka et al., 2018), for developing problem solving arithmetic strategies based on number relations (Björklund et al., 2021). Sowder introduced the idea of number sense, which can be described as a "non-algorithmic" feel for numbers, a sound understanding of their nature and the nature of the operations, a need to examine reasonableness of results, a sense for orders of magnitude, and the freedom to reinvent ways of operating with numbers differently from the mechanical repetition of what was taught and memorized (Sowder, 1992). Other researchers have highlighted the relevance of number sense as a component of the broader sense-making in mathematics (e.g., Yang, 2019) and in parallel to other constructs, such as the symbol sense (Arcavi, 1994), but also with respect to long-term learning difficulties in mathematics (Mazzocco et al., 2011; Baroody & Purpura, 2017). A "meaningful" numerical (arithmetical) competence therefore involves not only the execution of calculation to obtain a result, but also the capacity to discern the conceptual aspects of number to operate in strategic ways, to interpret the result in light of the given context and to comprehend it semantically. It is a competence the National Guidelines for the curriculum of the primary cycle, as well as the international surveys TIMSS and PISA, require (thus, not abandoned at upper secondary school). It is also part of the fundamental mathematical skills, numeracy, of the Programme for the International Assessment of Adult Competencies (PIIAC) survey, according to which the adult population (aged between 16 and 65 years) in Italy shows to be on average at very low levels (1 and 2, on a scale of 1 to 5). Difficulties or misconceptions emerge out of the analysis of the incorrect answers provided by grade 5 students to open- and closed-constructed response items of the national assessment of mathematics in 2022. They regard the specific arithmetic competence required and, often, a lack of sense as regards the given situations. We focus on these answers and what they may reveal about didactic practices. The object of our study is the nature of the incorrect answers given to various items of the national assessment of mathematics in grade 5. That is: Which are the ways Italian students are mistaken (provide incorrect answers) at the end of primary school and how they can be characterized? The items we take into consideration all concern the problem solving dimension and mainly involve the use of numbers or number relations to answer a precise request in a given context, or the need for using arithmetic strategies to solve the problem. Although with different goals, they aim at considering aspects of number sense, that is, an arithmetic competence and a conceptual understanding of number. We hypothesize that the analysis of the incorrect answers helps us to better understand not only potential arithmetic-related difficulties and misconceptions of Italian students at the end of primary school, but also where and to which extent it is necessary to act didactically. Used data The subjects of our study are grade 5 students who were part of the sample in the field trial of the national assessment of mathematics in 2022 and, therefore, answered the field trial items in 2021 (to test their functioning), which then have been used for the national assessment test. Indeed, the booklet of the main study can only consist of the items that show good psychometric results in the field trial. Concluded the field trial, its booklets are scanned so as to examine the students' answers in a more accurate way, especially concerning the open-constructed response items, and obtain knowledge of the difficulties entailed by the items. The sample is made of about 440 Italian students: even if it is a narrower sample than the national sample, we can consider it as significant having verified incorrect answers from the main study comparable to those found in the field trial. We therefore focus on the incorrect answers that the students partaking in the field trial provided to open-constructed response items, which involve arithmetic competence or strategies (mainly, from the Numbers and Relations and functions content domains). These items have in common the cognitive dimension and attention to fundamental aspects of number sense. For each item we consider in this work, of the kind open- or closed-constructed response, we have taken all the incorrect answers given by the students in the field trial. Then, we have examined the types of error shown by these answers (through their common traits, such as for example adding when the expected operation is rather the multiplication, or the algorithmic use of the given data or the writing of a result that appears separated from the context). We have thus divided the incorrect answers into groups. In this phase, we have drawn specific attention to the students' written protocols, when present, because in some cases the students reported the way in which they obtained the result. Having verified that the main study's incorrect answers

were like those observed in the field trial allows us to extend our observations to the main study. Each group of answers has been related to results from the literature or to the practical observation within the classroom, to understand more deeply what is revealed by the way of being mistaken of grade 5 students and how to intervene to foster "meaningful" teaching and learning. Finally, we can expand some didactic observations to other items of the national assessment test regarding other content domains and the knowing dimension. Our study wants to reflect on the mathematical competence, especially arithmetic, which must be developed at primary school (and beyond). With arithmetic competence, we mean here a number sense, therefore not only the use of numbers and number relations to model and interpret situations but also the capacity to reason on arithmetic tasks or tasks that imply arithmetic strategies for their resolution. The incorrect answers given to grade 5 items requiring such a competence show typical difficulties with reasoning on numbers, known misconceptions and gaps often related to execution and repetition habits, shedding light on how it is didactically needed at primary school to work more on the development of number sense and conceptual rather than procedural skills.

Keywords: number sense, problem solving, procedural, conceptual

From the analysis of INVALSI results to the creation of common tests for the improvement of students' skills

Ivan Graziani - Ombretta Crivellaro - Carla Sermasi - Monia Berghella

What is the point of INVALSI tests? What added value for an educational institution? What opportunities? It still happens today that for many school teachers INVALSI tests are seen as an "invasive" moment in "normal" teaching activities, even though there is widespread awareness of the need for a national "thermometer" of learning and much has been done to stimulate reasoned analysis of "areas" and "processes", conscious observation of results, and the importance of teamwork for improvement. INVALSI tests, like all external and periodic standardised tests, are not intended to replace evaluations, which are the responsibility of teachers, nor to represent the value of a school. Instead, they are a very important part of the National Evaluation System, a fundamental element in guaranteeing the quality of education for the entire country and comparability, both external and internal to the school and also between different countries. They also provide useful guidance first and foremost to teachers and then to the entire school community and the headmaster. The expert work devoted to the tests by INVALSI researchers returns very useful data and tools for use by schools. The results of the standardised tests themselves can complement the work of teachers to the extent that they are taken up, recontextualised and inserted into a new teaching pathway, in order to foster the development of 'competences' as envisaged by the regulations for the various school orders and grades. The tests therefore concern the entire Institute, which is thus committed to and oriented towards competence-based teaching. On the basis of what has been said so far, in order to extend to the entire school community the teaching practices aimed at improvement, starting from INVALSI data, the training course to be presented here, desired by the headmistress of the "Giorgio Bassani" Comprehensive Institute, in line with what has been planned as part of the Institute's Improvement Plan, was developed. The course was aimed at all primary and secondary 1^ teachers of the institute, as well as curricular teachers of Italian, Mathematics and also English. This choice was guided by the idea that, even if the results of INVALSI tests concern only a small part of the RAV indicators, the intervention for improvement starting from those critical points has an impact on the entire learning process of the pupils and the consequent development of their competences (the objective of extending the training to the entire school community). The output of this training initiative was to devise and then create disciplinary and interdisciplinary learning units, according to a number of proposed models - including 'backward planning', starting from the improvement objective defined by 'Priority 1'. The Istituto comprensivo is characterised by a school population with a medium-low socio-economic-cultural background and there is a higher percentage of NAI (New Arrivals in Italy) pupils, of first literacy and second literacy, than in the whole Emilia Romagna region. INVALSI results for Italian and Mathematics have tended to be lower than the national/area/regional average for a few years now, both at primary and 1st secondary school level. The MdP, in line with 'Priority 1' of the school's RAV, envisaged the improvement of the criticalities that emerged

from the analysis of INVALSI data. The analysis had in fact revealed that between 50 and 60 per cent of the students who took the test were in the first two levels of learning for both Mathematics and Italian. The first training meetings were devoted precisely to the presentation of INVALSI 2020/21 results by the Institute's Instrumental Functions teachers and to the comparison of the results of the institute's tests with the national data, before moving on to participatory reading and professional dialogue on the subject in the workshops. The plenary part of the training was dedicated to the meaning of standardised tests, the conscious reading of the returned data and related aspects. The main topics are outlined below: 1. Platforms as a resource 2. Knowing how to read data to design improvement 3. Comparison (external benches - national, geographical area, province- and internal benches between classes, between classes-) helps to give the "right" value to test results. 4. Constructing the learning environment (tangible and intangible elements, life skills, paying attention to variables affecting learning) 5. Distinguishing measurement and evaluation: assessment and evaluation, two processes with different tools and timing 6. The different perspectives of evaluation (subjective, objective and intersubjective) 7. Observation on multiple performances, plurality of instruments 8. Designing lessons and constructing multilevel tests. The search for effectiveness and quality 9. Collective analysis of evidence; "dismantling" errors with learners, highlighting strengths 10. Making sure that a truly educational assessment emerges from the evidence. The UDAs were developed by the teachers, in workshop mode, divided into groups, by subject and by order, with the support of tutors. The trainees of the three disciplines also devised some types of common tests, for parallel classes, on the topics on which the UDAs had been constructed, which they then used in class to assess the achievement of the objectives set out in the planning. To construct the tests, the teachers thought of using some INVALSI questions, selected thanks to the Gestinv 3.0 platform's research tools. The teacher trainers then provided feedback and carried out a reasoned return of the work carried out by the trainees: teaching units and common tests. Teachers were provided with examples of backward design of individual lessons and presented with other UDA design models: "the 5x3 , check lists, feedback for such units. Some "Road- Map" tools (https://www.istruzioneer.gov.it/2019/11/20/snv-la-road-map-per-il-ciclo-di-miglioramento-delle-istituzioni-scolastiche/) and useful sheets for sharing with the community were also presented. Some examples of Short Didactics were proposed and the didactic potential of various online resources were shown: those of Scuola valore Indire (with various proposals for the continuous training of teachers, from the PON ESF National Projects "Competences for Development, 2007-2013, with materials for the three disciplines involved, but also for others of the first and second cycle), a site for constructing evaluative Rubrics (Quick Rubric) and other digital tools to be used in the classroom (Mentimeter, Google app, Quizziz, etc.). The tools proposed by INVALSIopen were also presented. 56 teachers participated in the training, approximately 63% of the Institute's teachers. All the teachers who participated in the course constructed both the UDAs for improvement and the common subject tests for parallel classes. The tests were then carried out in the individual classes of the teachers involved. Due to the second wave of the pandemic, face-to-face meetings could not be held as planned; therefore, the Google space tools provided by the institute were used. As a repository of all course materials and for contacts with the teacher trainers, the Google classroom platform was used. Among the strengths of the project is the opportunity for comparison between colleagues and joint work both vertically between the two school levels and in parallel with teachers from the same class councils in an interdisciplinary manner, aspects that are never taken for granted, not even for comprehensive institutes. Awareness also grew that INVALSI tests and the tools supporting them can be used to do teaching and to consolidate knowledge and skills. Unfortunately, also due to the pandemic and the distance mode, it was not possible to develop some laboratory and research-action aspects, which were greatly reduced. What emerged, however, was the importance of working on the tests, not as 'teaching to test', but to reason about the development of common tests, to take INVALSI questions as an example in order to test students' competences also in the years not covered by the census tests. The fact of being able to put what they had learnt into practice immediately was another element appreciated by the trainees.

Keywords: improvement, data, training, UDA, common tests

THEME 13. SELF-EVALUATION REPORT (RAV) AND INVALSI DATA FOR THE SELF-EVALUATION OF ITALIAN SCHOOLS

ORGANIZER: INVALSI

COORDINATOR: MICHELA FREDDANO

OCTOBER 29TH: 2.00 P.M. – 4.00 P.M. {ROOM 3 LUDOVICA – TEACHING 4}

Standardized tests as the link between RAV and PDM

Ileana Ogliari - Andrea Guarnacci - Mariarosaria Orefice - Michela Zuccaro

As standardized tests are finally considered a didactic tool and no longer a mere bureaucratic fulfillment to be reluctantly adopted, as it has been for too long within Italian schools, what is their weight in the mechanisms that regulate the self-assessment of the schools? This contribution arises from a question emerged within the 'Istituto Comprensivo Manfredini' in Pontinia (Latina), a school located in the outskirts of the municipality of Pontinia. The resulting response has generated the willingness to analyze and interpret the data provided by INVALSI to build an improvement plan in line with the issues identified. The plan aims at defining a path capable of addressing these issues over a period of time. Translating the data into evidence after interpreting it, identifying the actions necessary to trigger the most effective strategies for improvement, involving all the stakeholders in the relevant internal committees ('Collegio dei Docenti', 'Consiglio d'Instituto') to kickstart the projects identified: the role of the 'Internal Valuation Committee' is central to raising awareness regarding what to do and how to progressively achieve the targets identified in the initial analysis. Defining the learning path, estimating an implementation time, monitoring the progress of the ongoing activities is the most effective way to achieve the defined goals. The research presented in the abstract outlines the stages of a method through which, considering the critical issues emerged, it has been possible to prepare the work plans that led to progress corroborated by the scores of the self-assessment tests which, in the various sections of RAV, have been higher. Data The platform of the 'Servizio Nazionale di Valutazione' (a strategic resource within the Italian Department of Education) represents the most accurate source for identifying strengths and weaknesses within the school. Analyzing the 'School Questionnaire', a document sent by the Department of Education, constitutes the first and crucial moment of reflection that will influence the preparation of a targeted improvement plan. By leveraging the questions related to the infrastructure, the personnel, the didactic methods and the relationships with the respective counterparts and stakeholders, 'NIV' outlines an initial picture of the situation which is not influenced by the self-referentiality of an internal reading when the data is benchmarked to other comparable schools. The next step consists of verifying in which sections of the RAV one is positioned, in order to better determine the necessary interventions: within the 'Results' section, which represents the core segment of the document, the data provided by INVALSI is considered the most useful source. The report's guiding questions are also considered significant: they encourage comparisons and lead to the attribution of a grade which, when adequately weighted and carefully assigned, is completely in line with the associated valuation method. This procedure clearly identifies the priorities for improvements providing, by reading the parameters of excellence associated with the highest scores, an implicit indication of how to achieve the defined objectives. The constant that accompanies the self-evaluation process throughout its various stages can be defined as 'sharing'. In that sense, data represents the most important term of comparison, especially when it comes out of the interpretation relating to the NIV and becomes the prerequisite to outline the improvement actions developed. The role of the working groups within the school system, who outline the strategies to achieve the targets and monitor the progress, is extremely important. The disciplinary departments (in particular the Linguistic and Mathematical departments) at a macro level and the 'Didactic Committee' (especially one that is entirely focused on standardized tests) at a micro level analyze the students' INVALSI results and raise teachers' awareness of the strengths and weaknesses identified, with a particular focus on the 'school-effect', the metric which weighs the value of the actions undertaken by the school to positively affect students' results. Checking where the students are making mistakes (and with what percentage of error) allows the identification of any flaws in the curriculum, effectively suggesting the corrections to be made to the improvement plan. Tailored tests are then designed, stimulating students' deduction and inference abilities, representing in the meantime a confirmation of the tests undertaken by the students in grade 2, 5 and 8. There are two types of different

results to consider at the end of the process that has been described so far. The first is linked to the students' performance, which, however, can be affected by objective constraints such as their backgrounds: a low ESCS index score is unlikely to be associated with positive outcomes. The second, not less important, lies in the methodologies used within the school to progressively reverse a negative trend over a period of time. Paradoxically, it can be deduced that the value added of a thorough analysis of a school community is driven by the negative grades available in the 'Results' section, which have been inevitably attributed in the first Self-Assessment Report completed in 2015. Following that report, it emerged the willingness to collectively think about the steps needed to improve the negative grades. In addition, the objective parameters provided by INVALSI to the schools through the detailed results analysis provided a valuable tool to abandon a self-referential perspective and adopt a comparative method while sharing best practices, also with other schools. Finally, the involvement of the broader community through a system of social reporting is very important: the description of the strategies implemented within the school represents an act of responsibility and transparency to raise awareness within the community towards issues that so often are unjustly felt distant.

Keywords: RAV, INVALSI data, indicators NSE

Participation and self evaluation for school improvement

Valentina Dell'Aquila

To promote a continuous improvement of practices and ensure the quality of formative processes, school self-evaluation represents a virtuous system resource. Autonomy and evaluation, says Cenerini, constitute an indissoluble binomial. Law 59/1997 provided for the adoption of procedures and tools to evaluate school effectiveness and Decree 150/2009 introduces the concept of measuring performance to achieve specific goals as an accountability principle. The first step of the evaluation procedure of educational institutions foreseen by the D.P.R. n. 80/2013 is self-evaluation, followed by external evaluation, improvement plan, and social reporting. An evidence-based self-evaluation process, capable of comparing data and analyzing indicators, defining methodologies to measure quantitatively and qualitatively internal and external effectiveness, defining tools and actions to determine outcomes and added value, requires the correct competence of the actors involved. This knowledge can be corroborated with work carried out through necessary tools (Bracci, 2003) to measure the potential value of the school impact through performance. The degree to which the organization can pursue its priorities and goals through a specific process determines its effectiveness, measured in terms of added value compared to the contribution in pursuing and achieving them. It is common knowledge to think of improvement as something that must be added numerically, without a rethink of a different paradigm. The self-analysis process of a learning organization that does not "escape dialogue with the contributions of external evaluation" but develops a form of active, conscious, and reflective participation, can promote awareness and empowerment; understanding to improve (Palumbo, 2014) means developing circular practices aimed at generating knowledge. The notion of a reflective practitioner is the starting point to develop a professional improvement process. Effective schools have a strongly coupled system, shared ties and a unity of purpose. When it incorporates shared values, to quote Selznick, an organization becomes an institution, activating protagonism and motivation. The objective of the contribution is to offer, through the documentary analysis, an in-depth study of the participatory approach as a shared model of school self-evaluation. Starting from the self-evaluation report (RAV), the research intends to explore the active role of participating communities by providing an overview of the use of standardized test data, their impact on teaching methods and training approaches for assessment literacy. It is not possible to change, disregarding the active involvement of the participants (Rapanà, 2005). An intervention characterized by an active and participatory approach of the group in the evaluation process is an opportunity to rethink teaching-learning practice aimed at improving the learning and participation levels of students. The participatory approach assumes the symbolic value of a relational practice that allows the group to learn through action, share experiences and build change. Debating and working on tests instead of working on the function of their solution (Cerini, 2014) permits to overcome self-referentiality of procedures. Participatory practices can contribute to the professional training

awareness directly involving teachers, engaging them actively and responsibly in the connection between theory and practice (Demo, 2016). Through an exploratory analysis and a documentary collection of data, evidence and INVALSI research based on the involvement of the actors in the evaluation process, the contribution intends to be a starting point to rethink a model applied to the self-evaluation procedure as an opportunity to improve teaching-practice and the learning participation levels of students. The aim is to develop an adaptable organizational model that becomes the grammatical culture of a community that creates and builds its common sense by collaborating in defining the investigation and the objectives it intends to pursue. With a culture of evaluation based on the close interdependence of performance improvement and training actions, an organization can achieve concrete objective improvement goals (Perla, Vinci, 2016). The hypothesis is to focus on how evaluation can be discussed to define a "road map" for the organization with the involvement of teachers, communities, administrators, researchers and parental representatives in the context of school quality improvement.

Keywords: self evaluation, school improvement, participation

From RAV to Social Accountability, from actions to conscious narratives. Introducing a school community that meta-reflects for the improvement

Annamaria Capra - Silvia Ceffa - Costanza Bruno - Grazia Tardio

The abstract presents the process activated by the Institute in order to make the school community participate and be aware of the different moments of the evaluation process, from self-evaluation to social reporting, and is configured within the didactic space of session 13. From a methodological point of view, the contribution deals with the following topics: the involvement of the school community in the self-evaluation process and the relationship between self-evaluation, external evaluation, improvement and social reporting. Focus of the presentation - How to make the self-evaluation process one of the factors of involvement and consolidation of a school community? - Which instruments should be set up for this purpose to collect data and evidence useful for drawing up RAV, PDM and the Social Report? - How to make these documents interact? - What strategies should be put in place to make them a memoir of collective experience? With a view to promoting the construction of a shared ground for comparison for the moments of the evaluation process, the institute has prepared evaluation questionnaires, project monitoring forms and common institute tests in order to make self-assessment an authentic process and to have data available to compare with those of the external evaluation in order to trigger paths of innovation and improvement at teaching and organizational level. Context The "Leonardo da Vinci-Anna Frank" Institute as of 2019 is the result of a resizing operation that has required an important process of redefinition of each sector of the Institute: organizational, didactic, administrative and accounting, in order to generate common approaches and working methodologies within a shared horizon. The institute is composed of ten school buildings, two pre-schools, five primary schools and three secondary schools: a very diversified reality distributed over three areas of the 6th district: Falchera, Pietra Alta and Rebaudengo in the northern area of Turin with the highest number of foreigners resident in the city: in this context, the school is an important point of reference for families and young people, as a garrison of culture and legality as well as a launch pad for processes of social mobility within the territory. As shown in the database updated to July 2022, the number of students attending and their distribution with respect to citizenship and origin are as follows: Total number of students: 1,543 • Italians 786 • allophones with non-Italian citizenship 613 of whom ROM cultural minorities 53 • allophones with acquired Italian citizenship 144 of whom ROM cultural minorities 28 • total ROM students 81 There are 36 citizenships present in addition to Italian one distributed in the different school levels and locations; the most numerous non-Italian citizenships present are the following: Moroccan, Romanian, Egyptian and Nigerian. The complexity of the context confirms the necessity for unitary management, capable of moderating differences, enhancing the various professional skills, and coordinating human resources through widespread educational leadership for social justice: this led to the choice of a methodological-organizational approach of a systemic and experiential type that places learning at the centre of the organizational culture. The search for a constant dialogue between the school's documents has also been fundamental: the Three-Year Educational Offer Plan (hereinafter referred to as

the PTOF), the Annual Programme, the Institute Agreement, the Self-Evaluation Report, the PDM and the Social Report are documents that express, according to the peculiarities of each one, the narrative structure of what each school plans and realizes in synergy with families and the territory, how it documents and reports to the various stakeholders. A red line therefore connects them, and within the sizing process the important task of the Director and the DSGA was to start from the documents of the two schools to produce new ones as the expression of a shared process. The first revised and redesigned document was the PTOF, which was followed by the school's Vertical Curriculum, realized with the cooperation of most of the teachers: after a year of work, it constitutes an important common ground from which to design the curriculum for everyday teaching. The start of the new three-year period of the PTOF, the drafting of the RAV and the finalization of the Social Report now constitute a further challenge to consolidate the new school community through its involvement in the various stages of the evaluation process, from self-assessment to Social Report. Subject and research assumptions How to make the self-evaluation process an inclusive process, an expression of a participating and aware school community. Collection of data and information through questionnaires, focus groups, interviews, sharing the results of structured tests. Motivation and purpose The practice of self-evaluation and evaluation is an indispensable condition for the creation of improvement processes. Sharing reflexivity and awareness with the various actors in the learning process is one of the Institute's aims: only by involving the school community in the self-evaluation process is it possible to make it a protagonist in the processes of improvement and change, as also underlined by the document: "Per un manifesto delle scuole delle periferie urbane" developed by a group of schools that call themselves: "the Schools and Peripheries Group of the National Observatory for the integration of foreign students and interculture", of which the school is a part. Actions, methodologies and tools The Institute intends to involve the school community through the following steps: • Data collection through questionnaires with Google forms. • Collection of information/operational proposals through focus/groups with targeted groups. • Monitoring the effectiveness and impact of the projects implemented. • Sharing the results of structured tests. In order to involve the school community through the collection of data from which to prepare the RAV, the following actions were decided upon: 1) Preparation of a questionnaire addressed to pre-school, primary and secondary school families consistent with the RAV indicators. 2) Preparation of a questionnaire addressed to pre-school, primary and secondary school teachers structured on the basis of the RAV indicators. 3) Preparation of a questionnaire for pre-school families and teachers to gather information on the educational offer, possible criticisms and ideas for improvement. 4) Preparation of a questionnaire for ATA staff (administrative and school staff) in order to collect data on the administrative-accounting and organizational dimension of the services. 5) Questionnaire for students (in preparation). 6) Monitoring questionnaire on the effectiveness and impact of the Projects. 7) Monitoring questionnaire on the effectiveness of the organizational dimension and communication (In preparation) In order to facilitate the comparison of internal and external evaluation, Institute Tests were prepared for parallel classes with evaluative criteria agreed upon at departmental level. The intention is to go beyond the Internal Evaluation Unit and broaden the players involved in the evaluation process, involving at least 90% of the school community in its several components: the aim is to make evaluation moments a widespread cultural heritage with a view to organizational and didactic improvement and the widening of educational success.

Keywords: self-evaluation, sharing, documentation, redesign, reflexivity, improvement

From RAV to reporting

Maria Carbone

The problem studied concerns the use of the data returned by INVALSI. Among the documents with which the action of an educational institution is carried out, understood as a complex organization, there is certainly the use of standardized data returned by INVALSI. The results achieved in learning are determined by the competition of several factors, so setting the goal of improving general data or in more specific sectors requires rethinking: teaching methodologies, learning environments and a reorganization of the institution as a whole. Among the documents drawn up by the School there are: the school questionnaire,

RAV, PTOF, PDM and social reporting, among these a section of te RAV is dedicated to the results in the standardized tests. The schools, for the definition of the self-assessment report, have adopted an online format prepared by SNV. Since the 2015/16 school year, in line with the provisions of RAV, all schools have planned and launched improvement actions, possibly using the support of INDIRE or other public and private entities (UNIVERSITIES, research institutions, associations The Invalsi data certainly do not have an evaluative nature neither of teachers nor of the School, but represent a goal towards which to strive in respect of the didactic and research autonomy of each teacher and the organizational autonomy of each individual institution. . The school's mandate is very multifaceted, it must accompany personal growth, foster the development of healthy and constructive relationships, develop an ethical dimension, prepare for active life through the acquisition of knowledge, skills and development of skills. A school can be considered a "good school" when it critically and not self-evaluates itself in a multidimensional way, paying attention to: levels of learning; acquisition of key competences and citizenship, guarantee of equity of outcomes, development of the ability to operate one's own balance of skills to make informed professional and work choices. (orienting function) Therefore, the quality of a school must be "conceived and measured as a multidimensional construct, which cannot be arbitrarily simplified to a single measure" (P. Sestito) To be able to evaluate, however, it is necessary to establish what can be evaluated, as the object of measurement must allow the attribution of a value and the comparison of these values on a scale, as any measurement without a term of comparison recognized in the same scale of values is just a given. For what has been said, INVALSI data can be considered useful, if properly used to make the school and the territory where it is located know and what it wants to achieve, therefore it can have a guiding action, for the whole organization and guide future methodological and organizational choices. This is an important service rendered to schools and not a measurement task on schools: the general objective is to stimulate those processes of self-evaluation for improvement purposes which are the basis of the National Evaluation System of schools. The work presented has the purpose of sharing the experience achieved in my school and the added value that a reading and interpretation of the data can give, in order to undertake improvement actions. The experience was carried out in a first grade secondary school located in a town in the Neapolitan province, which until a few years ago, was in a medium-high range due to its socio-cultural condition, currently the country has been hit by a crisis financial situation which led to a change in the general socio-cultural condition, and in addition there was an increase in the presence of non-EU citizens of different nationalities and consequently this increase also occurred in schools. The sections of the RAV are well identified: Context, Outcomes, Processes , Identification of priorities. The priorities to be identified are to be chosen from those present in the outcomes: results, academic results, standardized test results, key competences and citizenship . The NIV, made up of the instrumental functions and the heads of departments coordinated by the headmaster, has compiled the various sections very scrupulously, and before publication has exhibited it in the teaching staff to share the choices and priorities. Sharing the document is a very important phase as it is not a mere bureaucratic fulfillment, but represents the starting point for the improvement of everything that contributes to the improvement of learning and citizenship skills to which all the didactic action tends . The Institute in the RAV has identified as the first priority the raising of the results achieved in the standardized tests as the second priority the raising of key competences and citizenship. The reasons for this choice were different and attributable to the meaning of measurement and evaluation: ¬ Currently homogeneous indicators are not available at national level on the key competences of citizenship ¬ availability of homogeneous indicators at national level considered in the INVALSI tests ¬ Standardized tests are comparable, provide a benchmark and, add value. ¬ The reading and interpretation of the returned data is not self-referential and photographs the reality of the school from different angles (composition of the incoming classes, presence of foreigners, anticipators , variability between classes ...) ¬ The added value is a very important data because it clearly represents the result of all the actions that the school has done. ¬ Another very important section in the home of the SNV is undoubtedly social reporting ¬ The data returned are very detailed in each of its sectors, but in a college of teachers it would be unthinkable to share them all; consequently, to make a conscious use aimed at improving the school, some organizational choices were made. The first action carried out was the identification of a contact person who carried out specific tasks: selection and synthesis of the amount of data returned to the school, to communicate them in different ways to different recipients according to the purpose. the School Organization as the general data, the trend over the years, the heterogeneity between the classes and therefore have been illustrated in the Teaching Body and the School Council. A fruitful work has been the identification of the results achieved in the thematic nuclei in the individual classes. These results have been carefully analyzed in the departments, where the related disciplines converge. In the departments I reported, only data without section matching,

in the meetings by discipline, on the other hand, I guided the reflection on the individual questions and on the mental processes that had to be activated to answer correctly. In this reflection, the document in the section of INVALSI website that can be freely consulted was very useful. These meetings in the departments are the fundamental ones since, for the setting up of the Institute's curriculum and the choice of shared didactic-methodological actions. An important action is also the comparison of the tests of the previous and subsequent school orders because it allows to identify those mental processes that are fundamental to identify and subsequently strengthen. The agreed actions are included in the PDM in specific areas such as: Curriculum, Planning, and Learning Environments. It is a dynamic process that involves the school community and allows the full use of the tools of autonomy. The choice not to limit the meetings to the teachers of the disciplines involved was determined by the conviction that some mental processes in mathematics questions are mobilized by all the technical-scientific disciplines and in the linguistic ones by all the other teachers. A careful reflection was started on the choice of textbooks, respecting individual freedom, opting for those that proposed activities similar to INVALSI questions. Since the composition of the first classes is also returned, despite the efforts made by the Manager to form homogeneous classes, there are inhomogeneities between classes. In consideration of this, the School has made strategic choices of differentiated educational support using PON-FSE funds, Regional funds and MIUR in order to avoid this variance from persisting in the results at the end of the three-year period, guaranteeing all education and training equity. . The data were the subject of specific moments of reflection within the Board of the Institute, as they are crucial data for accountability . Meetings were also initiated with the teachers of the other two levels of school with a view to a vertical curriculum, to reflect on the discrepancy in the data returned by INVALSI. importance of participation even though they are not binding for participation in the State Exam. This action model has resulted in an awareness of the validity of INVALSI data and could represent a Best Practice . The school shared this organizational model in a benchmarking experience in the DM 663 project aimed at Strengthening the development of the National Evaluation System.

Keywords: RAV, PTOF, PDM, reporting

THEME 12. LEARNING ENVIRONMENTS AND STUDENT OUTCOMES

ORGANIZER: INVALSI

COORDINATOR: RITA MARZOLI

OCTOBER 29TH: 4.30 P.M. – 6.30 P.M. {ROOM 2 GIULIA – TEACHING 5}

The desing of financial literacy: resources and rules

Francesca Cimmino - Antonietta D'Avino

Teachers can create "learning environments" responding to the real training needs of the students to whom their teaching is addressed. On the basis of the epistemological foundations of the discipline considered, by studying the family and territorial context of the class group, each teacher prepares the content using the most appropriate teaching methodologies and the best suitable digital tools, so that the content is transferred into a skills that becomes a usable competence in different contexts to solve increasingly complex problems both in the real and the virtual world. The design can have several stages: you can review your steps, rethink your approaches, modify your techniques, upgrade some contents or enhance interactions with other subjects of the educating community (online and offline). The construction process usually starts from a "solid and founding" system and it is gradually implemented in a more or less extensive network, which also contains tools for evaluating and validating activities, which provide interesting data on learning itself and on the construction of outgoing competence. In a learning environment, it is not so easy the combination of "disciplinary knowledge, relational and emotional growth together with the collection of information on any enrichments or interruptions in the didactic path implemented", and the control of variables is difficult, but not impossible. It is the challenge that we all would like to win. The research question digs into this cave for precious minerals that should see the light simultaneously, during the implementation of structured activities, and which instead are most often mined in pairs, and mating is not always functional. What does the teacher do who wants to design a learning environment for a transversal discipline (financial literacy) which has its foundations in various fields of knowledge, but which determines a verifiable "competence" primarily in the "behavioral" field? What research tools does it have at its disposal, one above all can be considered the MINDSPACE framework, to "package" the content it needs, which "attitudes" it must verify so that the competence. I asked myself these questions while preparing lessons on Financial Literacy, which has been part of my learning curriculum for many years and which my school has also tried to develop through specific NOPs. My research for the structuring of contents has not always had happy results. I consulted dedicated platforms and read specialized articles, I attended training courses offered by the Ministry, compared the data reported by INVALSI - PISA with the analysis of the Notebooks of the Bank of Italy and the Einaudi Research and Documentation Center, but in addition to the repetition of information on what is meant by some specialized terms, I have not found teaching models that fully enhance the gradual passages to skills and competence. Many worlds, governmental (with strategies and guidelines) and universities, in collaboration with credit institutions and foundations, "spill over the network" programs whose effectiveness is often not reported. The reasons jump to the eye just when the teacher begins the design of the environment. Which connections are most appropriate for students to recognize the terminology of economic-financial literacy and to be able to simulate the actions underlying the specialized terms, given that, before a certain age, many of the behaviors attributable to the financial plan will not be tested (as behavioral economics studies point out)? Which teaching methodologies are more effective, given that the data reported in the Notebooks of the Bank of Italy and the ONEEF place us among those who have maintained the levels of knowledge of pre-pandemic financial literacy (awaiting the results of PISA 2022 provided by INVALSI, but they have not changed "attitudes", which were already weak during the 2008 crisis and which have remained so while we face the current one. Secondary secondary students, then, have the right to approach the different versions of monetary policy that alternate in the EU because they are the direct recipients of decisions taken from above and vice versa their "behaviors" should influence those same decisions. What must measure that part of the learning environment that is dedicated to the realization of artifacts, what type of product can a 12-year-old boy or girl build who must "make a personal profit" and at the same time and to improve society or at least not contribute to the deterioration? How much is it necessary to know about financial awareness to correctly evaluate an action in the economic field? The research work started from the four content areas of PISA financial literacy: money and transactions, planning and management of finances, risks and revenues,

financial landscape. The reference target is placed in the lower secondary school, therefore not all 4 areas could be considered in their entirety. If the category of money and transactions includes the awareness of different forms of money, the management of simple monetary transactions such as daily payments, expenses, value of money, cards, checks, checking accounts and coins, the learning environment I have designed must necessarily be inserted in a precise historical moment in which it is possible to identify significant parts of this area and not all of them. The choice fell on transactions in general. If the finance planning and management category includes skills such as revenue planning and management, both short and long term, and in particular the knowledge and ability to monitor income and expenses, as well as use of the revenues and other resources available to increase financial well-being, also here it was taken into account that planning is a dynamic action, which changes in the various historical periods because it is strongly conditioned by the context ("Context matters"). In the evaluation of the artifacts I took into account the MINDSPACE framework, declining it on the age of the students and on my evaluation of their attitudes during daily school life. The causal link between knowledge and behavior, in the financial context chosen for the designed learning environment, has been analyzed and is part of the evaluation rubric developed. Risks and rewards embody the ability to identify ways to manage, balance and hedge risks and understand potential gains and losses in a variety of financial contexts and products. This ability was judged difficult to detect because in the designed learning environment the historical research does not develop in a rigorous way, so I provided direct references in the webquest. Calculating the risk in an approximate way is a fairly simple estimation operation, but using calculation models was impossible. Even the category of the financial landscape that concerns the characteristics of the world of finance was unable to have much space in the preparatory work, in fact I preferred to lower the requests into a defined and standardized reality in which to move. Finance in the strict sense can also move away from the real economy and this passage of abstraction must be accomplished through a specific environment. The process categories concerned the cognitive paths of each group of pupils and in the final product the ability to recognize and apply the relevant concepts of the domains was revealed, evaluating the understanding of the examples made in the classroom, the analysis of the places on which to operate, the reasoning on different hypotheses of risk or gain. The terminology was also taken care of, but always contextualized in the historical period under examination. The task was greatly appreciated by the class, it was the drafting of a business plan for a trading company in the 17th century, during the birth of the world - economy. The conditions on which to set up the presentation have been defined in the track. The artifacts were presented during the History workshop. Each group, with imaginative names of shipping companies, showed images of how they thought about the fleet provided (evidently influenced by the examples proposed in class, graphs on the strengths of their business and related advertising. aware of what they have neglected in their business and of the weaknesses of some risk processing processes.

Keywords: challengers, mindspace, framework, context matters, evidences

INVALSI tests and environmental context: some operational impacts

Luigi Umberto Rossetti - Lucia Scotto Di Clemente

This paper aims to report the results obtained from the research carried out in some second-grade educational institutions in the area of "context of implementation and information system of INVALSI tests." Among the information tools available to INVALSI is the "Student Questionnaire," consisting of a series of personal questions addressed to students in grades V primary, III secondary, II, and V secondary. Specifically, the paper examines the responses provided by Grade 13 students to a questionnaire administered retrospectively aimed at monitoring not only how the INVALSI tests were issued by the school, but also the information provided to the students in me- dering to the purpose of the survey. The starting research question was identified in an attempt to understand whether educational institutions realize and implement everything necessary to ensure that students are adequately informed, prepared, and organized in the performance of INVALSI tests. The need for verification arises from the fact that in operational practice, often and willingly, some educational institutions identify the INVALSI tests only as a mandatory fulfillment and not in their true purpose and meaning. The main objective of the research is to

obtain a strategic information base related to three specific variables detected during the administration of INVALSI tests: 1. Context and environment of implementation; 2. Information to students; 3. Training/information to teacher-administrators. The research pathway was aimed at educational institutions in the provinces of Benevento and Avellino with a voluntary adherence mode. The questionnaire in the form of a satisfaction survey was administered through Google forms anonymously and did not collect any information traceable to identified or identifiable individuals. Special care was taken in the drafting and structure of the questionnaire (clarity and simplicity) and on the neutrality of the questions, particularly avoiding those with emotional reflexes. The administration of the online questionnaire was done by releasing the link directly in the classrooms after an explanation and explication of the research activity emphasizing its importance, providing clarifications to the respondents inducing them to answer as correctly and truthfully as possible. All questions were set in multiple-choice except for the last two (open-ended re-answer) whose main objective was to obtain indications of satisfaction in general with the tests conducted in their institution and their own opinion on the validity and importance of the tests themselves. Participation in the research was voluntary and not mandatory. The innovative element of the research is inherent in the attempt to acquire additional information to that collected by INVALSI with the student questionnaire, which can be made available to school institutions in order to self-evaluate and possibly intervene in areas of criticality. The research methodology used was descriptive, which is the most common form of an online survey whose quantitative nature allows the information collected on students to be statistically inferred. The main idea on which the research was structured is to better define a situation, attitude, or behavior of a group of people on a specific aspect. In the end, the grouping of the responses allowed for inferable data in statistical terms, enabling the meaning of the results to be measured across the entire population under study. The structuring of the research took into account a number of investigations: 1. Environmental (physical) context. - Environment in which the test was conducted (computer lab or classrooms); 2. Information context - Information about INVALSI (what is and what are the INVALSI tests for - Open Badge - assessment); - Information on the organization and mode of conduct of INVALSI tests (disciplines, duration, mode of conduct, etc.); - Implementers (who carried out the information activities). 3. Training context - Simulation/preparation activities for official INVALSI tests (official simulation or exercise tests); - Practice platform (type of platform used). 4. Organization - Arrangements for distribution of seating; - Mode of distribution of credentials and Student Information; - Management of papers received; - Initial communication of the administering teacher and communication on individual tests and management of the TAO platform; 5. Cell phone use. - Communication on cell phone use; - Cell phone use (request to turn off - hand overuse during the test - use after the test). 6. Performance of INVALSI test. - Mode of returning beads; - Attendance, behavior, and abnormalities during the test (presence of administrator teacher - entry of other teachers or other staff); - Relationship with peers (collaboration among peers - suggestions - behavior). 7. Environmental disturbance - Detection of environmental disturbance (closed/open environment - chattering - presence of other subjects - confusion). 8. Final considerations. - Consideration of the organization and importance of INVALSI tests (personal considerations). The results obtained at the end of the experiment are: - Data broken down by educational institution; - Data broken down by province; - Aggregate data; - Comparison report between institutions - SWOT analysis. Perspectives The research intervention was anticipated by a period of observation done in previous years to understand the problems and critical issues that plague School Institutions in the performance of In-validated tests. From the analysis of the results that were subsequently validated, it was evident the large amount of informative data that schools are able to collect in terms of self-evaluation. And it is from this data that we need to begin by initiating actions to improve the context, organization, and training/information of students and teachers. The contribution represents the first approach and certainly shows some methodological criticalities related mainly to the lack of sampling of observation recipients, which in our case was entirely voluntary. A future goal is to expand the research to the second classes as well and to initiate a path of the control system of these variables so as to obtain multi-year information data allowing temporal comparisons and especially control in case of initiation of improvement activities by educational institutions. It is hoped that it will be possible to validate and make the research universal enough to make it applicable in all educational institutions and other reference contexts.

Keywords: information, organization, environment, questionnaire, liking, SWOT

One chain leads to another in a laboratory approach

Ivan Graziani - Stefano Babini

Among the various questions proposed by INVALSI in the tests of the various school orders, there are some that have always interested us for our normal teaching activities in the classes, but above all also from a point of view strictly related to the different information that they can provide us with in our didactic research work. These are questions developed over several items that are not closely related to each other, as a student may answer a subsequent item correctly, even if he or she answered the initial or previous question incorrectly. An accurate analysis of the answers provided to these particular types of questions by the students, especially if done together with them, can help us in our work in the classroom, but certainly also contribute to a concrete improvement of the recovery and reinforcement processes for an overall evolution of the specific competences of the students (Zan & Baccaglini-Franck, 2017; Graziani, 2019). It is always important not to fall into the deleterious temptation of trying to train students to cope with tests, but rather to attempt to consolidate the teaching-learning process towards the achievement of truly consolidated and lasting learning. These particular questions constitute 'chains' of items and are structured starting with an easy, level 1 or 2 question, followed by two or three others of increasing difficulty. This type of question is very interesting to put to the students, also and above all in normal classroom teaching, because it allows them to verify at which level of difficulty of the questions the students manage to answer correctly and at which they do not. This allows them to then work in a more targeted manner and thus intervene better on those precise aspects detected, linked to the concepts, or even areas, at the basis of the questions. It would be important, in our opinion, to put questions of this kind also in the tests carried out during the school year. For this reason, our research focused precisely on these particular questions, which usually attract students due to the ease of the first prompt and, normally, prompt them to also read the subsequent ones with the serene certainty, or at least hope, that they have answered the 'opener' question correctly. In order to achieve this, we selected eight questions of this type, for grades 8, 10 and 13, and administered them successively to the students of the third grade of the Secondary School and to those of the second and fourth grades of the Secondary School of our Institutes. We also added to the mini-questionnaires we administered a short questionnaire with a few questions on any difficulties the students encountered in carrying out the mini-questionnaires, also with a grading of the degree of difficulty from 1 (a little) to 5 (a lot). The questionnaires were very useful in understanding the students' views on the questions submitted. In fact, they allowed us to understand why good students who answered the most difficult items correctly, had answered the first question incorrectly. From the questionnaires, we understood, by then asking the students to confirm, that those questions were wrong because they were considered "too easy to be true", according to a widespread idea that INVALSI tests, but also mathematics in general, are always difficult and require calculations in any case, a cause long known as the "didactic contract" (D'Amore, 2003). In other cases, we found that some students had not read the text well or had skipped the most difficult question because they had found the intermediate one too difficult. Talking then with those students, we discovered that they were actually able to answer the most difficult question, while in the previous one they had confused one concept with another. Being able to analyse the answers given in INVALSI tests together with the students, which is unfortunately no longer possible for the CBT tests, is a very effective and constructive part of the teaching-learning process. Even the normal tests taken in class during the year could be analysed together with the students who would not have to limit themselves, as is often the case, to looking only at whether they 'got a pass'. The questions used in our research were selected with the help of the search tools available on the Gestinv 3.0 platform (www.gestinv.it) from all the tests released for grades 8, 10 and 13. The purpose of our research was to compare, in the two cycles of Education examined, the grade awarded in mathematics in the first quarter with the completion of the various chains and to see if there was a good correlation between these two aspects, finding some correspondences especially with the high and low grades, but less so for the intermediate levels. Another aim, however, was to present these particular questions to our mathematical colleagues in the training courses and also within the subject departments in our institutes, precisely because, in our opinion, they are able to offer a very useful tool for dealing with some particular topics, also in a laboratory way and above all in cooperative learning. Many teachers are still unfamiliar with the invalid tests and, above all, do not understand the teaching potential they can offer in the usual school subject activities. In trainings with teachers of the two cycles of education, we have tried to give tools and ideas for using this and other types of tests in the classroom, to make the most of the great potential of the questions together with the students, in an active

way. Another aspect that should be better known by teachers of all levels, and which we provided to teachers, was the information and training potential of INVALSIopen website, but above all the enormous opportunities offered by the Gestinv 3.0 platform, with very accurate searches for indications, levels, topics and many very peculiar and useful aspects to make the most of the large number of items produced in recent years.

Keywords: questions, difficulty, verticality, laboratory didactics

THEME 5. THE USE OF INVALSI DATA AND MATERIAL TO IMPROVE TEACHING

ORGANIZER: INVALSI

COORDINATOR: GIORGIO CAVADI

OCTOBER 29TH: 4.30 P.M. – 6.30 P.M. {ROOM 3 LUDOVICA – TEACHING 6}

The connection between INVALSI tests in Mathematics, the school improvement plan and the teaching practices: our improvement path for "competent" teaching

Giuseppina Maria Grazia Cardillo

This contribution describes the main phases of a "vertical" work that I carried out as NIV coordinator of the comprehensive school to which I belong, with the aim of developing logical-mathematical skills, creating a concrete synergy between the two levels of school, in 'optics of continuous improvement, using the use of INVALSI data as a valuable tool to please the "strategic actions" provided for in our Improvement Plan and the reading, analysis and interpretation of data as a tool for "external monitoring" of trend of improvement processes. The object is the preparation of material to improve the valid results of the entire comprehensive (Primary and 1st grade secondary school), as foreseen by the Improvement Plan - PATH 2 << Improving the results in the standardized national tests of Italian and Mathematics in Primary and Secondary Schools >>, in order to achieve national outcomes in line with schools with the same socio-economic background. The work started in the school year 2019/20, developed in the critical two-year period of the pandemic crisis 2020/21 and 2021/22 in order to highlight the accumulated gaps in mathematics in order to intervene promptly. As NIV and FS coordinator at the PtOF, I systemically embarked on the use of INVALSI data to design didactic courses focused on developing logical-mathematical skills, to analyze their thought processes and bring out the most recurrent misconceptions. My work plan, agreed in the mathematics departments, focused on the analysis and reflection of the error as an important moment of cognitive learning, starting from the items that generated the most difficulties, to be able to analyze and discuss them in class together with the "active" protagonists, in order to understand the erroneous "triggering" elements, aimed at a positive and participatory didactic fallout. The documents used for the activity and available on INVALSI website, are the Mathematics QDR; the Mathematics tests of grade 2, 5 and 8; the 2019/21 test report and specific items taken from the Gestinv platform. Analysis of the results to reflect on the self-assessment action as a whole • position of the school by school level with respect to the national average, geographical area and region • distribution of school pupils in the performance levels defined on the basis of the national sample • analysis of the most critical items, to trace the solution hypotheses First hypotheses of interpretation as well as of a comparison that deals with: • class results • comparison between external evaluation (INVALSI tests) and internal evaluation in Ita / Mat • results of Ita / Mat tests by section and / or content area • weaknesses and strengths as a whole Student results analysis • Results (no. Wrong answers and comparison with regional and national%) • Errors (more frequent) A vertical didactic path, of a laboratory type, was created to improve the performance of pupils in the logical-mathematical field, starting from the analysis of the error. In summary, the work involved the following phases: • return and analysis of INVALSI results to the entire school community • reading and interpretation of outcomes and performance levels in mathematics, highlighting the links between self-assessment, evaluation and improvement • first educational proposals to be implemented with a view to continuous improvement • creation of a PRACTICE COMMUNITY (all teachers of primary and secondary mathematics), to encourage experimentation and dissemination of good practices produced • construction of an input TEST - with diagnostic function, for the secondary at the start of th school-year 2021/22, using INVALSI repertoire and tests for the evaluation in itinere for the primary • self-training with INVALSI materials: Mathematics framework for learning about the elements around which the measurement of skills revolves: scope, process, dimension, etc., INVALSI notebooks, reports and guides. • having examined various types of questions from the Gestinv3.0 database to understand the congruence between the school curriculum and the survey objects. • initiation of improvement actions in the two school levels • monitoring, evaluation and communication of the results obtained. The activity, shared among all the school Mathematics colleagues, saw us focusing our attention both on the construction of the common "entrance" test for the 6th grade class, and on the ongoing evaluation tests intended for 2nd and 5th grade classes. And for the first time we investigated all the wrong answers obtained from the questions administered: of the "closed" type (ie a

unique and numerical answer), to trace the possible cognitive obstacles that prevented them from answering correctly. INVALSI tests therefore proved to be a useful self-assessment tool to improve the performance of their students and consequently of the entire Institute. For the preparation of the "vertical" test for grade 6, the teachers of both orders selected various items from INVALSI database, in order to test the "incoming" skills of all 1st secondary classes. Characteristics of the entry test for all entrants to secondary school (school year 21/22) • N ° 20 items selected for several years on the NUMBER of the INVALSI QDR: • Skills goal "The student moves with confidence in written and mental calculations with natural numbers and knows how to evaluate the advisability of using a calculator" • the most complex, but also with medium difficulty (from level 1 to level 5 according to INVALSI classification) • those in which the distractors were very attractive • items with open (very few) and closed (most) answers • time 60 min • use of the INVALSI grid to analyze the responses At the end of the correction, the first reflections on the solution strategies (learning processes put in place by the pupils in "doing" the tests), the cognitive obstacles, etc., were collected in order to initiate corrective improvements. Through a meta approach, I have always activated and activated a whole series of reflections in the department vertically on the results, operating the sharing of the same at the level of the teaching staff. The last phase of the work involved the administration of a questionnaire, designed by me, for all the mathematics teachers involved in the activity, which gave me back a picture of precious contextual information and news relating to the pupils' relationship with mathematics. . In particular: • I collected the teachers' opinions on the contents of INVALSI tests • I have known the characteristics of the didactic activity carried out in the classes participating in the INVALSI tests. The purpose of this work was to - use INVALSI precious assets as a lever for school improvement; - transform the error into a resource and observe how the students use their skills and knowledge, overcoming difficulties by activating specific strategies; - develop and strengthen shared reflections between teachers of the two different orders - Having the double framework of "comparable" entrance assessments has allowed us to proceed with a targeted educational design, having precise parameters in relation to knowledge and skills and monitoring the validity of the methodologies adopted through intermediate parallel tests. The data collected showed that the method adopted allows to achieve positive results. The graphs and tables concerning this comparison were shared, analyzed and discussed also in the class councils. Specifically, in both levels there were significant increases in the accuracy of the answers. In level V, compared to the national figure, the average increase in correct answers was 20%; in level II, compared to the national figure, the average increase in correct answers was 25% And the errors made by the pupils involved in the tests have always been minor compared to INVALSI reference test. The work approach still suffers from the "qualitative" character as we have focused on "updating on the most common errors" committed by pupils; certainly the future direction will also be to start a quantitative approach regarding the distribution by levels of the correct answers. The teaching team involved in the work understood: - the validity of INVALSI tests as tools to analyze one's own didactic action and redesign it in a functional way to the learning objectives - the importance of using INVALSI questions in teaching practice (validity of INVALSI test constructs), as a detector of misconceptions and / or incorrect concepts as a training resource - the frequent use of INVALSI items in classroom assessment practices Since the improvement process is still underway, it must be implemented with the parallel introduction of the same work carried out by the Italian department, to proceed with the evaluation and monitoring and return of the improvement actions initiated in the coming years. The work revealed the strong misalignment between the use of tests and declared classroom teaching practices, so in the future it will be the task of the NIV to propose a work plan that strongly encourages the use of INVALSI tests to the community of teachers, in order to make them object of analysis in a pro-active and improve key.

Keywords: good practices, continuous improvement, error analysis

Focus on the concepts of variable, parameter and unknown in some INVALSI tasks

Giada Viola

The role of variable, unknown and parameters is often confusing for students, and this does not allow them to have to fully master the mathematical objects they are dealing with. Some researches have been

conducted analysing this aspect in different school grades (Funghetti & Paola, 1994; Ursini & Trigueros, 2004) and the 3UV model (three use of the variables) was developed. Thanks to this model, it is possible classify students' actions, in order to study the interpretation, they give to variables, parameters and unknowns and the use they make of them. In particular, the three uses of variables are divided into "working with the unknown", "working with the generic number" and "working with variables in a functional relationship" (Ursini, 2011). The purpose of this experiment is to study the ability to use parameters, variables and unknowns when solving INVALSI tasks and how incorrect use may have influenced the results of these tasks. The subject of this research is the analysis of answers to two INVALSI tasks of grade 10, one in the area of "numbers" and one in the area of "relations and functions". The tasks taken into account recorded a low percentage of correct answers against a high percentage of incorrect or missing answers. These data allowed to highlight a widespread difficulty with these concepts, giving rise to the need for a more in-depth analysis the causes of these results. Therefore, a qualitative analysis was carried out on a small sample of students to focus the attention on management of the concepts of variable, unknown and parameter. The aim of this study is to highlight and analyse what actions are implemented by students when tackling problems that require the mastery of these concepts and to better understand what difficulties are encountered. The two INVALSI tasks of grade 10, used in this study, are the following (Gestinv 3.0): 1) "An equation is given in which x is the unknown and k is a real number. The solution of the equation is 0 for k = …" 2) "A car park offers customers three tariffs: Tariff A: 15 euros for whole day (24 hours) Tariff B: 1 euro per hour Tariff C: the first hour free and 1,20 euro for each hour thereafter. a. Mario has to leave his car in the car park for 8 hours. Which tariff should he choose? Answer: The tariff … b. Which is the number h of parking hours for which the tariffs B and C are equivalent? Write down the calculations you did to find the answer and then report the result. Result: h = … hours". The first task is from 2012 and is in the "numbers" area. The percentage of correct answers is 15.4%, the percentage of incorrect answers is 42.3%, the percentage of missing answers is 41.2%, the rest are invalid answers. The second task is from 2014 and is in the area of "relations and functions". The percentage of correct answers is 38.4% and the percentage of incorrect answers is 25%, while the percentage of missing answers is 35.2%, invalid answers correspond to 1.4%. In this research, the focus is on the second point of the problem. In both cases, the correct answers are less than 50%, while the sum of incorrect answers and missing answers exceeds 60%. These percentages make it possible to emphasise that, at national level, students experienced difficulties in solving these tasks. INVALSI tasks, presented in the previous section, were submitted to students attending the first class of a classical high school, in the final part of the school year. The class consisted of 17 students who had acquired the concepts of solution and equation. Moreover, they were able to manipulate algebraic expressions to solve a linear equation. Exercises on equations with parameters were not performed, but the concept of parameters was known. At the end of this second task, the students were asked to make a graph representing the problem situation. At the end of the task, a discussion was conducted on what emerged from the answers. The answers collected in this experiment were analysed with the 3UV model in order to highlight which actions the students were able to activate and which they were unable to implement. The first task, following the description of the 3UV model (Ursini, 2011), requires the student to be able to "interpret the symbolic variable that appears in an equation as a representation of specific values", "substitute the variable with values that make the expression correct" and "recognise and identify in a problem situation what is not known and what can be found taking into account the conditions of the problem". Furthermore, in the first task there is a reversal of the demand that is usually present in equations. In this case, the students have the value of the unknown and must find the value of the parameter for which it is valid. The "x" represents the unknown in the equation but not in the problem, a role that is covered by the "k"; this inversion creates confusion in the students. (Furinghetti & Paola, 1994). The following strategies emerge from the students' answers: - attempt to find the value of "k" by assigning random values in order to verify equality; - assign "k" the value 0 and find the solution to the equation; - assign "k" a random value to determine the solution of the equation; - assign "x" the value 0 and find the value of "k". The last strategy, which corresponds to the correct one, was implemented in two cases. Most of the students encountered difficulties in reversing the aim of the problem, i.e. "find k by knowing x". Therefore, in this case they have difficulty recognising what is not known in the task. Despite this, most of them can handle the concept of a parameter and are able to recognise that it can have different values. To solve the second task, the student must be able to "translate through symbols a functional relationship, based on analysis of the problem data", "translate through symbols general statements, rules or methods", "express through symbols the unknown values identified in a certain situation and use these symbols to write equations," and "determine the unknown value appearing in an equation or problem using the

necessary algebraic and/or arithmetic operation" (Ursini, 2011). Most of the analysed students answered correctly but only a few of them were able to generalise through symbols and create a graph consistent with the problem situation. The strategies chosen by the students can be summarised as: - list the prices for each tariff as the hours go by; - perform the lowest common multiple between 1,2 and 1,0; - generalise the situation. Students have great difficulty in creating the graph, especially, when there is no prior generalisation. In some cases, however, the ability to express a situation with symbols and to use these symbols to write an equation was useful in producing a graph, they were able to arrive at the intersection of two lines. In this task, it can be seen that most students avoided the problem of generalisation by going straight to performing numerical calculations. From the results of these tasks, it emerges that some students have difficulties in certain practices of the 3UV model and that some situations necessary to simplify or solve certain situations. Thanks to this model, it was possible to focus on certain actions that were implemented or not implemented by the students. In this way, the analysis carried out made it possible to highlight the practices most used by the students and in which they encountered the most difficulties.

Keywords: parameters, unknowns, variables

Rethinking the curriculum of reflection on language between INVALSI items and valential grammar

Anna Maria Moiso - Arianna Fontanot - Alessio Trevisan

Rethinking the curriculum of reflection on language between INVALSI items and valential grammar The aim of this research is to discuss how studying data about the 'Prova INVALSI – grammar section – with particular attention towards the most common mistakes made by the students, may help to improve the educational practices during the middle school years. Hence the research would like to pursue at least two different goals: first, a 'diagnostic' one, which means to find the potential biases and transform the language teaching methods in order to provide a wider and deeper acknowledgment of the Italian language as a whole. Secondly, a pedagogic goal, which aims to help the students overcome their weaknesses by facing the most common mistakes. Starting from 'INVALSI items', the research presents a model with a more holistic approach towards the language, which tries to outdo the prescriptivism of the norm, in favor of a more heuristic method. The test is devised to probe and evaluate the abilities of recognising and manipulating existing linguistic structures, as well as to apply known grammar rules in new contexts. The test presents different types of exercises: • identification (subject; predicate; phrases and syntagmas with their own function) • cloze texts (orthography); • valential grammar; • tree-shaped diagrams for syntaxis analysis. The focus group has been working on different enunciations out of context, so that the students have been able to concentrate on building and manipulating different linguistic structures and functions one by one. The activities have been based on a learning mechanism which is built on a reflection both shared among the members of the group and individual. The following parts describe the most important points of our grammar teaching approch. Regarding to phonetics and orthography is fundamental to understand that the language, the signs, the sounds and the significant given to them are social construct; towards experiences and simulations, like manipulation game of sound, syllables, words, the students arrive to build the semantic triangle. Then they can analyze the orthography as a rules' system deliberated by linguistic institutions as correct forms to sound's transcription. Moreover, orthography offers the possibility to discuss about storical and social-linguistic questions (e. g. orthography of some words towards intellectual or popular way, typical mistakes of regional italian speakers). Concerning to orthography, in addition to dictation exercises, we use "INVALSI items" as the ones that follow. ♣ Complete the sentences with correct expression. Choose from following ones. Attention: there are some expressions that can be used more than one time, and others that don't be needed. (Prova INVALSI 2014, Grammar section, error percentage 53,6%) ♣ Complete the lacking words in the right way. (Prova INVALSI 2014, Grammar section, error percentage 71,1 %). Regarding to the parts of speech, so-called morphology, teachers build a participative analyze model following either morphological or semantic or distributional or syntactic criteria. This choice allows two things: 1) a heuristic progress of learning community; 2) a different way to analyze language and her elements not just monolith but as multi-significant forms into sentences and

phrases. In fact, these choices offer the possibility to keep united morphological and syntactic level: it allows to avoid a segregate learning and to produce a holistic language learning. The meta-competences activated during a process of learning as the one we describe let be more accessible "INVALSI item" as the ones that follow. ♣ In which following sentences "oltre" is a preposition? (Prova INVALSI 2012, Grammar section, error percentage 56,9%) ♣ In the following text underline all the articles. (Prova INVALSI 2013, Grammar section, error percentage 55, 4%). In a grammar curriculum revision, syntax must be faced at the same time of morphology: not as functional and semantic perspective but in her structural ones (nuclear phrase). Valential grammar is the approach to follow: it offers continuous point of reflection. This approach force to reflection because it doesn't operate vertically or horizontally but it requires a rebuilding of the phrase during the analysis. Capacity of break up syntagms will be the cornerstone: the students will be able to classify them as noun syntagm, verb syntagm, adverb syntagm, preposition syntagm, adjective syntagm. Gradually, the students think about the function and the semantic role of different syntagms; teachers introduce, towards inductive reasoning, the concept of "complemento", as it is determined by grammar traditional teaching approach. During learning process, teacher removes schematical praxis "question-function" to favorize a more deep activity of linguistic reflection to improve deep understanding. Furthermore, at the end of second class of middle school, after a long work about valential grammar, teacher can propose to analyze sentences with syntactic trees. Syntactic trees train students to rebuild the thinking, to see graphically how the thinking develops. Later, students analyze not just simple sentences but also complex sentences. The theorical and methodological references are the same, valential and generative grammar. This linguistic analysis, that force to decompose and rebuilding sentences in a different way to horizontally or vertically analysis, allows to improve linguistic meta-competences, that can be used to deal more successfully "INVALSI items" as the following ones. ♣ What is the subject in the following sentences? Write it next to each sentence. Attention: write also the subject when it is implied. (Prova INVALSI 2017, Grammar section, error percentage 70,5%). ♣ Observe the following diagram. Which one of the following sentences coincide to this diagram? (Prova INVALSI 2013, Grammar section, error percentage 67,3%). In conclusion, starting from data and learning experiences, this speech wants to demonstrate how general linguistic approach is fundamental in learning practices: teacher should translate the linguistic acquisitions in a learning schooling practices. Primarly, educational institutions, private or public they are, must create mediation learning instruments (e. g. textbooks) and training courses that support and qualify Italian linguistic teaching in a heuristic prospective.

Keywords: phrases and syntagmas, valential grammar

Punctuation. A stranger?

Anna Maria Moiso - Roberta Strocchio

Punctuation. A stranger? Our research stems from the need to fill a gap, which emerged especially during a creative writing workshop with the creation of a yellow story. The gap appears to be very present in the various school orders because, even if everyone knows the punctuation marks, not many know how to explain how they are used, and few use them correctly. With our work, we wanted to go beyond a didactic that entrusts the teaching of punctuation to a deductive approach, to propose a educational method that focuses on the fundamental functions of punctuation, from segmenting a text to the syntactic function of bringing to the foreground the hierarchical relationship between propositions; from the emotional-intonative function to the metalinguistic one, that is, of commentary. Starting from Serianni's statement: "Among the various norms that regulate the written language, those relating to punctuation are the least codified, not only in Italian. Furthermore, the uncertainties are compounded by the disagreement of scholars on the overall interpretation of the phenomenon, as well as on the definition and classification of individual interpunctive units Serianni, Grammatica Italiana, UTET 1989" we tried to make people understand how punctuation can completely change the meaning of sentences. We resisted the "naive" idea that punctuation is only a pause to "let the reader breathe", emphasizing that the pauses indicated by interpunctive signs have instead a logical-syntactic, semantic, and textual nature. In fact, punctuation does not correspond to the management of pauses, but to the domain of the sentences and therefore plays a fundamental role in the field of syntax. Our research involved all school cycles. Initially, in kindergarten and in the first two years of primary school, we only worked y on the emotional-intonative function, by reading aloud. In this phase, the exercise was entirely focused on proxemics: while the teacher of the class was reading, respecting the more or less long breaks, the learner had to move and stop for more or less long, depending on the pauses perceived by the reader. From the third primary class we have introduced the full stop, the colon, the semicolon and the comma in segmentative-syntactic function. This discourse was resumed in the lower secondary school, by analyzing simple and complex sentences. In the upper secondary school, we worked on different types of text (newspaper articles, popular science texts, literary texts), deepening the use of punctuation also in its enunciative and metalinguistic functions. Finally, we worked on INVALSI items, on tests built on INVALSI model and on texts without punctuation to evaluate the achievement of the skills that the research had proposed. This intervention involved four primary school classes, three sections of lower secondary school and two two-year classes of upper secondary school. A second class devoted two months of didactic programming to a creative writing workshop, which consisted of writing detective stories: much of the correction of the papers was devoted to punctuation, which was truly "unknown". A long work of collective interpretation of the texts has made it possible to analyze the various functions of punctuation, not only those that are normally considered by textbooks or explained during classroom lessons, but also those concerning punctuation marks as element of style, which allow to give rhythm, to communicate emotions and to underline dialogues. The motivation in the work of self-correcting one's stories in order to create publishable eBooks appeared more effective than usual and allowed the students to deeply assimilate corrections and suggestions that, normally, in the correction of tests and exercises, seem to fall on deaf ears. It is relevant how, after about two years of distance learning, the correctness, fluidity of writing, as well as textual coherence and cohesion, were particularly penalized and in need of care and attention. A valuable aid in the work of reflection on the use of punctuation came from the text by BEPPE SEVERGNINI, L'ITALIANO. SEMISERIE LESSONS (2007) which, with the usual irony, dedicates some specific chapters to punctuation. Here is an example taken from the stories of the students of the second scientific high school: Example 1 A stream of consciousness ... As soon as the game was over he and his father who had seats close to the tunnel from which the players were exiting decided to make an attempt to try and grab a player's shirt, the moment came when LeBron headed towards the tunnel saw James holding a billboard that had only 4 words is my birthday, LeBron saw it and understood immediately and decided to give him the shirt, at that moment the boy's heart was a thousand he could not believe the

greatest basketball star had given him the shirt. Correct version: as you can see, many of the corrections concern punctuation: As soon as the game was over, he and his father, who had seats near the tunnel from which the players were exiting, decided to give it a try to try and get his favorite basketball player's shirt; There came a time when LeBron, heading towards the tunnel, saw James holding up a billboard that read "It's my birthday". LeBron saw him, understood immediately and decided to give him his shirt: at that moment the boy's heart was beating a thousand, he could not believe that the greatest basketball star had given him his shirt. The texts of the tests: Primary School INVALSI tests 2017 05 C10; 2019 05 06; 2021 05 08; 2021 05 10 lower secondary school Enter punctuation and capital letters where you see fit. The seven undines a sailor who had prepared the ship for a long voyage came aboard and swore an oath to the sea the sea would protect him and take care of his ship and he would remain faithful to him for life and would never wish had to stay ashore for a long time but here seven undines half rose from the waves they heard his oath and sank back into the depths of the sea the sailor sailed for a long time on land and sea his wealth increased but not he was able to be happy little by little the nostalgia for his country seized him one day his ship landed on a beach full of charm and gardens in bloom where he saw walking an enchanting girl who soon conquered his heart also that of she was conquered the sailor asked her in bride sold the ship built a splendid house on the beach adorned it with refined treasures like a royal castle and there he took his diligent bride one night, however, when the sailor rested ava in his arms the seven undines pushed themselves ashore and approached his palace they sang a terrible song and the crest of a wave, crossing the shore, overturned on the house the house creaked at the first wave followed by another one that a third broke through the door and burst into the entrance a third that burst through the window and a fourth from above and finally a fifth that carried the sailor away into the wild sea bubbling with foam here welcomed him the seven undines that carried him down to the fund probably the sailor still lives today in the depths of the sea every year when the May moon shines he goes back to his destroyed house to save his beloved wife but every time the seven undines bring him back (from Mari & Rubini, sea and its legends) high-school BEPPE SEVERGNINI, THE ITALIAN. SEMISERIES LESSONS (200, pp. 77-78) there are those who fell in love with the comma wrote giacomo leopardi in a letter to pietro giordani (1820) I for myself knowing that clarity is the writer's first debt I have never praised the avarice of signs and I see that often times a single comma well placed gives light to a whole period there are those who made money with a comma is the case of lynne truss author of the bestseller eats, shoots and leaves (2003 the title describes the actions of a gunslinger eats, shoots and if he goes, just remove the comma eats shoots and leaves and tells about the habits of a panda eating buds and leaves the comma does not always have such dramatic consequences but it often helps to clarify the subject and therefore life much of the logic wrote nicolò tommaseo could be reduced to a treatise on commas the comma is ductile but it cannot do everything it cannot for example separate the subject from the predicate marco looks at his wife's hair and gets scared or the predicate from the object marco looks at the wife's hair must not precede a relative limitation the wife showed her husband the hair she had just ruined while it is common before a relative explanatory the wife who had been to an unconscious hairdresser scared her husband marco [...] presenting himself with a squalid punctuation it's like being seen with sloppy hair marco gets scared and he's not the only one.

Keywords: functions, punctuation emotional-intonative, segmentative-syntactic metalinguistic

TECHNICAL EDUCATION FROM HEPHAESTUS TO INDUSTRY 4.0 - The “unfair advantage” of technical education: consolidating and improving the educational offerings of an economic and technological technical institute in Tuscany's most “lyceum-oriented” provin

Marta Castagna - Gabriele Orsini

The "Zaccagna-Galilei" Technical Institute is located in the province of Massa Carrara (MS), in the northwest of Tuscany, on the border with Liguria. In Tuscany, the percentage of students enrolled in the first classes of lyceum-type secondary schools (“Licei”) is 58.8 percent; in the province of MS this percentage is 68.8 percent. The remaining 31.2 percent is distributed between technical and professional institutes. In recent years our province saw a marked increase in the percentage of students enrolled in Licei, to the detriment

of those enrolled in technical schools, thereby creating a strong mismatch between the school reality (in particular, the numerical consistency of graduates in the economic-commercial area on one hand and in the technological area on the other) and the offers from the world of work, which do not always find specific figures to employ and train. The preference for Licei is sometimes related with an orientation postponement: the choice of an effective life project is in fact deferred to the post-diploma period. Such criticality has led our Institute to a deep reflection on teaching practices, learning styles, technologies, environments and tools, in order to achieve a quality educational standard that is able to provide adequate responses to the expectations of all stakeholders (students, families, teachers, companies) and to introduce innovations, synergistic actions and good evaluative practices through which we can consolidate and constantly improve our educational offerings. The analysis of data obtained from the EDUSCOPIO statistical platform (university outcomes and employment outcomes) shows a steadily increasing employment index of graduates in the last five years, with significant consistency between study path and type of employment, in the face of a steady decrease in the waiting time for the first job contract and of a decrease in the physical distance between home and workplace. As for academic studies, matriculations have increased in recent years, reaching about 50 percent of graduates; 35 percent of graduates pass the first year, reaching the amount of academic credits (CFUs) established for their curriculum. The analysis of INVALSI G10 and G13 data shows implicit dispersion slightly exceeding 5 percent of the total number of students; in school-year 2021/22 students not admitted to the next class were 2.5 percent: of these, 80 percent were not admitted according to Presidential Decree (DPR) 122/2009, due to non-attendance or dropping out of school, especially at the end of the second year (explicit dispersion). Also, INVALSI data evidence a slight generalized downward learning trend in the last two years (to be confirmed in 2022 data), along with a special need to implement language skills (especially for English). Hephaestus, the forerunner STEAM (Science, Technology, Engineering, Arts and Mathematics) god, showed what technical education was to the ancient Greeks: the τέχνη, that is, professional expertise and mastery of art rules, as distinguished from both mere practical experience (ἐμπειρία) and ἐπιστήμη (purely theoretical scientific knowledge of the causes that justify the rules of an art). The philosophy of art should not be separated from the philosophy of technology: in this perspective, we have joined the PATHS ("a Philosophical Approach to THinking Skills") program organized by the National Institute for Documentation, Innovation and Educational Research (INDIRE) in order to provide students with an additional tool for both innovative learning practice and consolidation of critical thinking. The unfair advantage of technical education is to acquire a degree which is immediately spendable in the world of work, as well as the ability to access post-secondary education (be it superior technical education, professionalizing courses or academic studies). Flexibility, teamwork ability and a good mastery of the English language are the soft skills most demanded by companies. We have worked on conscious orientation by organizing school-work alternation (PCTO) programs that have also taken the form of conventions on post-diploma paths, in collaboration with Universities as well as Superior Technical Institutes (ITSs); several agreements have been signed with companies and local institutions to promote knowledge of the local technical education offer: first-degree secondary schools were also involved in this process, with the awareness that life orientation can begin well before the ending age of compulsory education. Comparative analysis of the overall EDUSCOPIO and INVALSI data has led us to reshape our educational offerings so that companies can readily find graduates with skills that match their needs and so that our graduating students can readily find companies that match their skills. Also thanks to funds from the Ministry of Education, we have worked on learning environments, especially technical laboratories, reorganizing them globally in both setting and equipment. The pandemic period inevitably led to a reduction of in-person activities and, as a direct consequence, to a remodulation of class schedules: whenever possible, we tried to focus the available in-person time on laboratory activities, also with a view to inclusive innovation. The collaboration between school, companies and Universities has found in the laboratory teaching the appropriate venue to innovate curricula and to develop competence-based, collaborative and experiential activities, stimulating the orientation of students toward future choices of tertiary education or job placement. The integration of educational offerings has allowed not only to strengthen Institute's instrumental and logistical resources, but also to implement and share experiences to enhance learning practice, with particular regard to STEAM and technological skills necessary for the Enterprise 4.0 transition and for the fulfilment of the National Recovery and Resilience Plan (PNRR).

Keywords: teaching practices, technologies, school improvement

The INVALSI tests: start being spectators and become protagonists. The action research path carried out by “IC Aldeno- Mattarello”

Annacarla Geniali - Tiziana Chiara Pasquini - Chiara Tamanini - Mirko Vignoli

In the school-year 2021/22 an action-research process on INVALSI methodology has been carried out in the IC Aldeno Mattarello, focusing on the tests, the documents and the results that INVALSI makes available to schools as a part of its training action. The project has involved the teachers of the institute throughout the entire school year (September 2021 - June 2022) with monthly scheduled meetings. This has allowed the teachers to grasp the enormous potential of INVALSI tools and to convey towards a more conscious didactic action, within an established community of practices that questions how the cited documentation can become part of a daily didactic action and how they can contribute at improving learning outcomes. The INVALSI tests were presented as an opportunity to understand the difficulties that pupils encounter in applying the learning and skills detected by the tests. An action- research process was carried out, divided by disciplines, based on the analysis of the reference frameworks, the analysis of the tests administered and their results. The teachers analyzed the tests and the single items, they interpreted them trying to understand which cognitive skills are involved in their execution. The project was therefore conceived as a training course for teachers with the aim of enhancing, at a conceptual and cognitive level, the pupils' linguistic, logical, inferential, argumentative and understanding skills. The training was therefore intended as an important opportunity for general and timeless reflection on teaching methodologies for Italian, Mathematics and English with reference to the competences tested by INVALSI. It has been shown that it makes no sense to "train" the pupils to do INVALSI-like tests since the skills required by the tests are the same as those contained in the national and provincial school curriculum . The first meetings were proposed to all the teachers of the Institute, both of the Primary and of the Lower Secondary School, differentiating them according to the type of school the teachers belonged to, with the purpose of going through the reference frameworks of the standardized tests and the numerous resources that INVALSIopen makes available for each discipline and competence investigated. These were the first moments of a potential educational action in which concerns, doubts, prejudices and perplexities that inevitably haunt a part of teachers, accustomed to living INVALSI tests as a mere obligatory fulfillment, were collected and handled. Subsequently, the action- research process was concentrated above all on groups of primary school teachers. The teachers of the primary classes therefore implemented an action- research path, led by expert trainers, linked to the three disciplines investigated by the tests, to ensure that this training could have an immediate impact in rethinking the didactic action of each of them. This led the teachers to question the strategies aimed at reducing the variability in learning levels, both within the same class and between parallel classes, in basic skills in Italian, Mathematics and English. action- research path’s objectives was both directed to fill the gaps of the students demonstrated to have, and to enhance the skills already possessed, developing and/or consolidating their disciplinary and transversal skills. From October to June the training sessions were conducted separately, according to the disciplines and grades the teachers are assigned to. The sessions were held on a monthly basis and lasted an hour and a half of each. They were run by expert trainers of the specific disciplines (Italian, Mathematics and English) with the support of a tutor-teacher for each group, chosen among the trainees, to guide the colleagues towards the achievement of the objectives of the action research. The courses took place with the support, the supervision and the coordination of the Headmaster. The framework of the contents agreed and addressed for each discipline was shortly the following: - understanding and analysis of part of the printouts and graphs of the test results; - INVALSI reference frameworks for each discipline; - guidelines to reading the tests already administered as a tool for didactic analysis with the use of videos and texts from INVALSIopen; - illustration of the types of texts, stimuli, and items of the tests of each discipline with specially prepared exercises; - criteria / ideas for teaching activities and for the self-evaluation of the tests with any further contents on the proposed by the teachers. At the end of each session, the teachers, guided by the experts, agreed on an activity to be prepared for the next meeting and to be proposed to the pupils of their class. At the following session the results obtained and the difficulties encountered by the students with respect to the cognitive processes to be developed were analyzed. All the groups started from the shared assumption that the INVALSI tests can be a useful tool for research, reflection and growth for teachers since, starting from the analysis of the results, they can identify paths for improvement and in-depth study of teaching practices, with respect to both the cognitive well-being and the emotional well-being of the students. With regard to cognitive well-being, INVALSI tests can become a good "gymnasium" for observing thought processes. In

fact, they allow teachers to analyze the cognitive functions involved in carrying out the proposed tasks and therefore to organize school work, trying to encourage children to activate those processes. In this sense, the action-research path proposed concrete suggestions of didactic activities to be implemented in the classroom, to improve the understanding of the tasks and the related solution strategies. With respect to the emotional well-being of students, various studies highlight the close link between the perception that students have of their ability in various disciplines (the 'school self') and school performance, including how they perform in structured tests: "Students disadvantaged can, and often do, overcome adverse conditions if given the opportunity to do so. This includes providing these students with equal learning opportunities and promoting their motivation and self-confidence so as to reach their potential "(PISA in Focus 5, How do some students overcome their socio-economic background? In www.invalsi.it). An attempt was therefore made to detect the degree of concern/serenity perceived by the pupils before/during/the test and any difficulties encountered, as well as the level of satisfaction at the end of the test. Concrete teaching strategies were proposed to be implemented in the classroom to improve the self-esteem and serenity of the students. Moreover, the process also caught the resistance of teachers with respect to the training action itself and the recurring stereotypes they perceive, trying to address them with various strategies. A fundamental methodological part of the course was the analysis of the items in the solution of which weaknesses were found at national or institutional level, prompting the participants to question the performance of their pupils. Ultimately, a "new" reading of the INVALSI tests was shared, intended as an opportunity to understand if the competences, the objective of curricular planning, had really been achieved, also verifying the reason why children make typical and atypical errors in their execution. The action research accompanied the teachers in designing a variety of tests in progress, following the indications provided and supporting their experimentation in the classroom, creating a research pedagogical laboratory within the institute. Virtual classrooms have been created to sustain the co-design of structured tests on the basis of official documents and resources made available on the web, to foster sharing among the teachers and to create a repository of materials. The course has generated, in a significant part of the teachers, a sense of professional rethinking and has allowed to hoard various sets of items or real tests structured on the INVALSI model. Aa a result, at the end of the course, a group of teachers has produced tests totally unpublished. The report will show both the positive aspects and the problems encountered along the way and the solutions identified for overcoming them.

Keywords: action, research, teaching, Italian, Mathematics, English

THEME 12. LEARNING ENVIRONMENTS AND STUDENT OUTCOMES

ORGANIZER: INVALSI

COORDINATOR: RITA MARZOLI

OCTOBER 30TH: 9.30 A.M. – 11.30 A.M. {ROOM 2 GIULIA – TEACHING 8}

Real, digital or immersive Learning Environments – technology as a resource to improve student outcomes

Claudia Califano

The expression Learning Environment dates back to about the nineties of the last century and, to date, there is a vast bibliography on the subject so much so that it is now common heritage the idea that by learning environment we mean no longer and not only a physical space, albeit multifunctional, but also a digital space, which is that of one of the many dedicated platforms and, even the immersive one of augmented reality. The very use of the expression in the plural declination denotes its progressive evolution in an extensive and dynamic sense, as well as closely linked to the spread of information technologies; these have multiplied the nature and typology of learning environments on which the world of research has spent extensively, while also offering a series of valuable opportunities to improve student outcomes and, more generally, outcomes, both in terms of educational objectives and the acquisition of 21st century skills. The Educational Avant-garde Movement has also developed a series of Ideas to innovate the organizational and didactic model of the school and, in which, technology plays a decisive role, even if challenging. During the period of the first and long lockdown, but also in the following school year, it was seen how technology could serve to create a stimulating learning environment, effective provided that new strategies for managing school time, educational resources, the context are adopted and above all a new paradigm of teacher as a learning facilitator is defined. Some actions of the PNSD, from those included in scope 1 to those aimed at the digital training of teachers and students, have represented an opportunity to implement the human, instrumental and infrastructural resources of schools, often grappling, with chronic shortages of comfortable physical spaces that have been possible to compensate with digital ones. Regardless of the construction models of learning environments, from the MUST model to the one known as CSSG, it is clear that careful planning, design and monitoring are crucial in order to promote the acquisition or consolidation of students' basic skills, ensuring the achievement of the expected learning objectives. The core of this short contribution is to highlight how the use of information technologies can serve to create stimulating, innovative and effective learning environments, which can counteract phenomena such as functional illiteracy and improve students' reading-writing skills and oral skills. A basic reference, in this sense, is offered by the methodologies for active learning, such as the TEAL method, applicable to various learning contexts, but also by the possible adoption of forms of time flexibility or compaction, which can better adapt to some particular teaching experiences, in which the role of the various constituent components of an effective learning environment is decisive, referred to in the ILE project. INVALSI 2022 Report, in fact, in detecting clear signs of slowing down the collapse of students' basic skills and of a partial reversal of the trend, highlights, however, the increase in the territorial gap between North and South, with respect to which it is possible to intervene by favoring organizational and educational innovation. The analysis of the data of INVALSI surveys of the last three years of the High School in which I teach, has highlighted some critical issues that have been tried to respond to through the design of targeted paths aimed at individual classes or groups of interclasses, so as to implement the percentage of students with level 3-4-5 skills in the basic disciplines and, particularly in Italian. From the examination of some objective data and empirical evidence, relating to PCTO projects, activities and paths, carried out in digital environments and involving the students of eight classes of the various addresses of the Institute, it emerged that the authentic use of information technologies in teaching and the use of paths in specially designed digital environments, can represent a strong point of the training offer whose results and learning outcomes are objective. So the PCTO Profession Blogger course, for example, has favored the consolidation of the reading-writing skills of the students of two classes of the second two years, as well as the creation of a short PodCast on the archaeological evidence and the beautiful landscapes of Reggio Calabria, realized as part of the Apollo Project has served to improve the linguistic-communicative skills of some students of a fifth class of the Lyceum. These experiences will be followed by the realization of projects already financed with European

funds for the realization of educational experiences in the world of the Metaverse as a new frontier of Learning Environments. The bibliographic research was aimed at analyzing the various models of innovation of the learning environments referred to in the publications of M.Castoldi, Pier Paolo Limone, ADI and research in the university with a doctoral thesis on the subject. The reading of various publications on pedagogy, didactics and integrated technology was followed by the analysis of ISTAT data on reading habits and the use of technologies, INVALSI Reports 2019, 2021 and the results of the 2022 learning surveys referring to the second and fifth classes of the high school in which I teach. The strong drive for digital innovation of the learning environments of the Lyceum in which I teach is highlighted, among other things, also by the data relating to participation in the STEM, Digital Board and PON-FSE/FESR calls, to which I added those relating to the results of the 2021/22 year-end ballots and of the individual PON and/or PCTO Modules created in a dedicated digital environment. For a general overview of the problem, I carried out a careful and updated bibliographic research on the theme of Learning Environments and the use of information technologies as learning facilitators and effective tools to improve the overall results of students, both in transversal skills and in those more strictly linguistic-expressive. Starting from the first attempts to renew the physical space of the classroom, up to the training opportunities offered by digital and immersive learning environments, I have highlighted how the very idea of the learning environment has been characterized as something extensive, dynamic and flexible, so much so that over time, different design models of innovation have arisen. At the level of the Institute, I briefly illustrated what have been the project experiences conducted in recent years, to create innovative and motivating learning environments for students, also thanks to the funding obtained through participation in the PON-FSE and FESR calls, relating to various actions of the PNSD, such as those of Area 1. Finally, I considered it appropriate to reserve a brief space for the reflections and the overall balance of some training courses, conducted in digital environments and proposed during the past school year to the students of some third and fourth classes of the Liceo Nostro-Repaci, highlighting their strengths but also some critical issues. The conclusions also drawn from the analysis of the disaggregated data emerging from the National Surveys of recent years, highlight an overall positive trend, in relation to the commitment of students in activities that have provided for the systematic integration of new technologies in teaching. If we refer to the learning outcomes and outcomes of the students of the Liceo Nosto-Repaci who have participated in didactic activities and / or PCTO paths (formerly Alternanza Scuola Lavoro) developed in a digital environment, specially designed and declined in an analytical way, we can certainly say that the balance is extremely positive for everyone. In addition to the clear reduction of disciplinary shortcomings in both the scientific and humanistic fields, a strong motivation to learn skills and competences in the use of digital as a resource for study and work was also detected by the questionnaires administered to students. The dispersion often present in the frequency of PON or Institute projects was practically zero and the data is consolidated and incontrovertible, especially if it refers to projects and didactic activities concluded in the current school year (Apollo Project) and characterized by a multidisciplinary approach and authentic use of digital technology, which I mentioned in a short speech during the VI INVALSI Seminar in November 2021. What also emerges therefore is the undoubted effectiveness of the use of information technologies to create stimulating, motivating and effective learning environments provided that two cardinal principles are respected, namely that of careful planning and adequate training of teachers, especially on a methodological level. Once the computer literacy season has ended and the DDA has passed, in order to truly seize the opportunities offered by future digital, virtual and immersive learning environments, teachers must be adequately prepared to believe, why not, also in a new articulation. of school time, in which the compacting of the timetable can favor and improve the management and effectiveness of teaching activities.

Keywords: learning, environments, information, technology

Flexible didactics in Learning environments for XXI century competences

Daniela Ruffolo - Ivano Neri

During the past few years Don Milani Infant and Primary school of Giffoni Valle Piana in Salerno province has addressed its pedagogical approach to the Project of Innovative Learning Environments - ILE (2011-2013) by OECD, favouring the renewal of didactic approaches and of school space to create "learning environments". Teachers are aware that a holistic systemic approach is needed, paying attention not only to the methodologies used by them or to the management of the relations with pupils, but also to all those elements characterizing the learning events. The concept of "environment" is very meaningful, as it recalls the ecosystem in which learning experience takes place. Moreover it recalls the systemic paradigms of an ecological perspective used to analyze life environments, according to 2012 National Guidelines for Curriculum, 2018 New Scenarios and the UN Agenda 2030 for Sustainable Development. Don Milani Primary school has also become the "Civic Center" of the local Educating Community called "Edu@ction Valley", a learning ecosystem involving the territory of Picentini Valley in the province of Salerno and its communities. Edu@ction Valley is on the front line in educating the new generations, regularly cooperating with the school. The sinergy between the school and its territory implies sharing the same vision, mission and good practices, and participated planning as well. The "learning" environments inside and outside the school shift the attention on the learner and on the process that qualifies the learning experience. In this sense the school has organized training courses for teachers and experimental labs to create innovative and inclusive learning environments. These environments are integrated with the use of information technology, thus implementing teaching prectices based on "the processes ruling learning" (beyond disciplines), using games, emotions, digital tools, cooperative and metacognitive strategies, standardized tests to evaluate ex-ante and ex-post results. Thanks to the rich teaching programme, including afterschool programmes (EU funded courses, Scuola Viva and Con i bambini projects, all financed with European Union funds), teachers and third sector experts cooperate in synergy to develop pupils' key competences, soft and digital skills. As far as metholodogies are concerned, they take into account the key factors of social constructivism characterizing the present learning strategies with the expression CSSC learning (De Corte, 2010), with a reference to the 4 peculiar aspects of effective learning: constructive, self-regulated, situated and collaborative. In details, Don Milani school, together with Edu@ction Valley has focused its attention on "situated" learning, that is on the relation with the setting and the specific content of the activities generating the setting, in coherence with "the theory of action" (the student's actions have a central role, considering his relations with the social and operative context and cultural psychology, underlining the role of cultural-symbolic systems in developing individual knowledge) and Vygotskij's theories (learning as the result of the interaction between the individual and the environment, the social dimension). Nowadays digital technology is an essential aspect of the context, not only for its technological value but also as a new type of socialization. The intervention aims at presenting some of the school most meaningful learning paths, based mainly on informal and non-formal learning environments. Due to COVID emergency and distance learning, once at the end 2021 teachers and pupils came back to school in environments ruled by COVID restrictions, it was necessary to find alternative spaces, especially outdoor ones, mainly to favour social interaction, support the most fragile pupils in reoinforcing their key competences and develop pupils' concentration, motivation and interest to learn. An immediate response was the bioclimatic pergola installed by school thanks to the funds of the social cohesion-related programme Con i bambini "L'ora di lezione non basta" coordinated by Senza Zaino Association. The pergola is an informal space with no furniture (desks, chairs,board), equipped with cushions and rugs, where pupils regularly have reading, Maths, English lessons and much more, working individually, in pairs, small and large groups, with the aid of technology (tablets and internet) and didactic games. Moreover several learning activities took place in naturalistic environments, in cooperation with the Centre for Environment Education, CEE Southland, a partner of Edu@ction Valley. The Centre planned the activities with the school, and the courses were financed by Con i bambini project. The "green" activities introduced not only envirnomental issues, but also STEM: they have involved volunteers of the local associations in Edu@ction Valley. The labs were held during school holidays, such Easter and summer holidays (June and July), showing the importance of the educative alliances of the territory. The labs were attended by school pupils, with partcular attention to the most fragile ones. Thanks to EU funds, in June and July the school organized a Street Art project addressed to 5th form pupils of primary school: guided by a well know local artist and by tutors, the pupils designed and made a mural to requalify a wall in the school backyard. In total autonomy pupils chose the themes of

the mural, drew the draft, chose the colours and techniques to be used, associating painting to ceramics. They made and painted some ceramic decorations for the mural in the school ceramics lab. Learning in stimulating and creative environments contributes to raise children's motivation and self-esteem, allowing them to act in complete serenity, developing all their potentials, paying respect to themeselves, to other people and to the context they live in, contributing to create an innovative and inclusive school that leaves no-one behind.

Keywords: learning environments, laboratories IT, learning outcomes

Service learning: a new methodological approach to innovate the learning environment

Ornella Campo - Rosario Distefano - Maria Grazia La Rosa

The post pandemic period at Liceo Scientifico E.Fermi in Ragusa has been focused on implementing a new structural methodological change aimed to overcome the traditional system in favour of more innovative techniques, open-teaching oriented. This latter facilitates students to approach learning proactively and promotes a wider learning space, going beyond the traditional as well as outdated face-to-face approach. The focus on learning as "the sum of those educational situations featuring teachers and students involved in a framework of several components, composed by resources and rules" comes from the awareness of using information technologies combined to workshops. This enables students to use and enhance even their no Cognitive Skills (NCS), gaining a significant and concrete knowledge. The introduction of the Service Learning, thanks to the National law "l.92/2019" which reshaped the transversal civics teaching, goes over the "notional" and "academic" existing method, promoting a holistic approach to real world growing faster and more focused on social welfare. The Service Leaning technique was tested in two different classes of Liceo Scientifico E.Fermi (a 2nd year class and a 5th year class), approaching the real life as "learning environment", introducing students to the local community. In this perspective, learning, values, soft skills and behaviours are connected to the civic commitment. The two proposed projects, wider explained overleaf, look at learning environment as an "opened system" able to build-up relationships with third parties and the entire local community, becoming itself the "pedagogic space". In line with the School growing plan, the Service Learning promotes the following innovative tasks: learning and acting, improving learning and strengthening the active citizenship. Service Learning offers several tools relating to NCS, promoting social behaviours as the service, sharing, altruism, solidarity, and the awareness that acts for common purposes. In light of this, students show proactive behaviours as they are the actors over all path: from identifying needs to make decisions and implement measures, valuating related results. The study shows how Service Learning improves students' performances, based on both INVALSI and school tests (please note that the simplified panel is illustrative and not exhaustive). Used data The students of the second year (class 2A Scienze applicate) decided to "give new life" to benches , in order to retrain the historical center of the town and to encourage the so called book sharing (bring a book - take a book, that is swapping books). The proposal came from after analysing the state of decay of five stations of book crossing present in the town. The activity of reading, choosing and reviewing books offered the studends a better motivation than the simple task of reading; the "physical" placement of the books, each one with its label made by the students, offered the students the occasion to feel active, part of the community, to take care of their own town. The project, its realization and the creation of a website whose link is http://librocorsaro.altervista.org/, gave the students the opportunity to use digital instruments to create a service useful to the cyber citizen. On the site it is possible to find a section called "Book maps" showing the right location of the benches with books. The students of the fifth year (class 5 D Nuovo ordinamento) tried to make old electronic devices work again thanks to a software called Open source with the project "TrashWare" whose aim was to make old electronic devices work in order to be used by the community again. With the help of the Mayor of Ragusa, recycled electronic and digital devices were donated to entities, associations, or families. To extend the life, even of a year, of old devices reduce million tons of CO2 emissions and the special disposal of special waste called RAAE. In accordance to their attitudines, their existing skills and exspected performances, the students were divided into two groups according to the two

chosen macro areas: a technical and a management. The first group searched for old devices, setting up a technical laboratory, the second group provided for the organisation and according to Ragusa Mayor's representants focused on the social needs of the community. The skills used were classified according to the ESCO taxonomy and in particular S5 - working with computers , S4.2.0 - organising, planning and scheduling work and activities, S4.4 - performing administrative activities , T3 - self-management skills and competences , T3 - self-management skills and competences, , T5.1 - manipulating and controlling objects and equipment , T6.2 - applying environmental skills and competences, , T6.3 - applying civic skills and competences. The activities were projected according to the framework OECD CERI of the project Innovative Learning Environments (2013) to build a new LE that puts in relation "the pedagogical core", made by students (who?). teachers (with whom?), contents (what?), and resources (with what?), with other key-elements such as the leadership for the change, the organisation, the instruments to evaluate learning processes. According to the same framework, seven principles characterise innovative learning processes: the centrality of students, of their involvement, the social and collaborative aspect of the learning process, the importance of emotions and motivations in the learning process, the importance of individual differences, the key-importance of evaluation, in particular of the formative assessment based on feedbacks. The introduction of the Service Learning, thanks to the National law "l.92/2019" which reshaped the transversal civics teaching, goes over the "notional" and "academic" existing method, promoting a holistic approach to real world growing faster and more focused on social welfare. Both learning processes used the methodology of Service learning that was a useful help to improve the students, the teachers and the school community. The students developed active citizenship and management skills (cooperative learning) and problem solving skills. Above all, good results were reached as regards social skills such as the care of relationships, the ability to establish peaceful relationships, the ability to overcome tense situations of everyday life, the ability to express an opinion after a choice. The students of the two involved classes achieved good performance at the end of the second term: • in the class 2A Applied Science, made up of 25 students, 60% (15 students) reached an average between 8 and 9, 28% (7 students) between 7 and 8, and 12% (3 students) sufficient results; • in the class 5D New Sistem, made up of 25 students, 32% reached an average between 9 and 10 for the admission to the state exam, 60% between 8 and 9, only 8% between 7 and 8, no student had an average that was less than or equal to seven. We are waiting for the INVALSI report to verify the results reached by the students of the two classes in the standardised tests. The two projects were an occasion for the professional growing of the teachers involved who had the opportunity to test the importance of the teaching transversality and cooperation of obtain successful teaching results.

Keywords: learning environment, innovation, service learning

THEME 13. SELF-EVALUATION REPORT (RAV) AND INVALSI DATA FOR THE SELF-EVALUATION OF ITALIAN SCHOOLS

ORGANIZER: INVALSI

COORDINATOR: MICHELA FREDDANO

OCTOBER 30TH: 9.30 A.M. – 11.30 A.M. {ROOM 3 LUDOVICA – TEACHING 9}

The impact of DAD on the school context: The role of self-evaluation in school

Alfonsina Mastrolia

The current educational scenario has been marked by the epidemiological emergency related to the dissemination of COVID-19 which has introduced the new digital challenge in schools, providing a significant boost to the use of technology which through DAD and/or DDI has entailed a necessary reshaping of teaching activities. This context has radically changed the situation, disrupting the slow dynamics of change in Italian schools (Molina et al., 2021). Starting from the experience of DAD/DDI, the aim of the work is to understand what indicators could be useful for self-evaluation in the transition to e-learning and able to describe the changes produced in the learning environment and on teaching methods. The object of this reflection required the analysis of secondary data provided by INVALSI during the internship activities to design the main process dimensions that guide schools to draw up the Rapporto di Autovalutazione. The focus of the analysis has been the set of indicators concerning the choices taken to support the digital training of teachers and the types of activities covered by the territorial network agreements. Specifically, the descriptive analysis covered the following RAV descriptors: 3.6.a.3. number of training activities by national thematic priority; 3.7.b.2. themes type for which the school enters into agreements. Operationally, a secondary analysis of the two indicators "Processo - Pratiche gestionali e organizzative" has been conducted in a diachronic dimension in which the development of self-evaluation should adapt to a context in which teaching needed to be redesigned. Beginning from a reflection on the emerging issues in a deeply changed school context the focus moved to the definition of the new quality criteria of school evaluation oriented to DAD and DDI. The aim of the research is to understand if self-evaluation indicators are reliable and valid (Marradi, 1980) to describe the current condition of the school or is useful to define new indicators that encompass the current needs, requirements and demands of teachers and students. The need of new skills (teaching and learning) has changed organizational conditions, requiring a reshaping of teaching practices and facilitating the acquisition of new skills. The research hypothesis is that the intensive use of technological devices has necessitated the adequacy of self-assessment approaches to educational policies from the perspective of digital and innovative teaching. The current emergency context has been an accelerator of the digitization of education, which identifies the school system as a tool that can multiply its effects in terms of flexible, non-standardized, personalized organization of teaching. The change dictated by the pandemic has created in the Italian school an unforeseen condition that has accelerated towards a profound and unexpected change (Marcianò, 2020). It is necessary for schools to have a self-assessment tool such as RAV that allows them to know their starting point in order to improve and transform technology into a useful teaching tool. An issue arises whereby the self-evaluation process, to be effective and efficient, requires a continuous review of the indicators offered to the school to assess its internal processes in the light of the profound transformations society has faced. In Italy, after the enactment of Law 107/2015 the MIUR published the PNSD, representing a shift in the digitalization revolution as the Italian education system aligned with international standards by making teacher professional development a permanent strategic goal. The Plan assumes that we need to foster digital culture in teaching by promoting teacher training actions to support school innovation, with a view to lifelong learning. The RAV identifies teacher training an objective through indicator 3.6.a and allows the investigation on the digital skills achieved by teachers and intervention on them to encourage the raising of the quality of training courses. To support the adoption of innovative teaching plans, the ability to promote collaborative relationships between the school and the territorial community, investigated by indicator 3.7.b of RAV, becomes fundamental. In the PNSD the school networks promote methodological-didactic and digital innovation, which is achieved through an agreement on common goals and values aimed at enhancing territorial potential and resources. This is the reason to investigate two RAV indicators that would allow the school to self-evaluate itself in a profoundly changed school context. A context in which the innovation of learning environments is due to

the integration of professional skills of teachers who know how to build an environment rich in resources, flexible and open to research and constant monitoring (Falcinelli & Gaggioli, 2016; Ranieri et al., 2018). Last but not least, the school's ability to put itself forward as a strategic partner of territorial networks and to coordinate different actors, promoting networks and agreements for training purposes. RAV indicators, to be reliable, must assess educational practices to monitor the quality of the educational system and return data that can explain the digital and innovative change of the school. The basic assumptions are that the use of a set of indicators, the collection of data and the subsequent return of results are capable of triggering processes of improvement in educational action, identifying strengths and weaknesses, in the direction of a democratic and quality school. The evaluation process in schools constitutes a participatory, collaborative, democratic model, aimed not only at producing quantitative data (Semeraro & Aquarius, 2011), but also incentives for the assumption of greater responsibility by the entire school community. In fact, providing the performance information of educational policies represents the purpose of self-evaluation, the accountability. It is functional to build a relationship of reciprocity and transparency between resources, processes and products of education according to criteria shared both among policy makers and the public, allowing them to learn about school functioning. The added value of this research is the opportunity to reflect on the importance of a possible revision of education quality indicators that are insufficient to describe a complex reality such as schooling, especially in relation to recent changes. The data we have seem to indicate that there is a national interest and an awareness of innovating teaching through ICT to train teachers in their active and conscious use. To conclude, the results of the analysis show that actions and initiatives for innovation in schools remain in the minority in most Italian territories. From this perspective, the results achieved describe the state of the art of technological innovation in Italy following the digital challenge posed by DAD and DDI. What is meant to be emphasized is that the school has assimilated the outcome of a long transition in the use of digital technologies, stimulating the overcoming of a traditionalist logic of teaching, in favor of the adoption of didactics oriented toward innovative processes of organization and flexible management of time, space and teaching methods. The reflection has been done on the RAV becomes a priority to enable schools and networks to improve their performance through the tool of self-evaluation. As a consequence of the DAD experience, new social dimensions and indicators of the impact of educational practices on learning environments need to be introduced in the RAV in order to highlight any associations between innovative teaching practices and the construction of better learning environments. The revision of the RAV represents a real challenge for the entire school community, most recently involved in a process of renewal of its organizational and technological structure. The central objective pursued in this work has been to highlight that the complexity of educational action, characteristic of complex policies, implies the adoption and strengthening of self-evaluation procedures and tools.

Keywords: COVID-19, DAD, ICT, RAV, indicators

Valu.E: an expert evaluation experience at Istituto Comprensivo Perugia 6

Annamaria Romano - Loredana Paglialunga

The experience that we intend to present originates in the participation of the Comprehensive Perugia 6 Institute in the training course within the Valu.E for schools Project - Action 2 Valu.E promoted by INVALSI, aimed at school managers and teachers of the central macro-area Italy (Lazio, Umbria, and Toscana). The training course, lasting many years and carried out in distance learning mode, saw several schools, selected by INVALSI through a random sampling, with the aim of providing strategic and instrumental skills useful for evaluating the functioning of the training and organizational processes. The purpose of the contribution is to illustrate how the training course allowed the group of participating teachers to start a reflection on the institutional documents of the School, RAV and Improvement Plan, to reread them in the light of INVALSI data and through the Visiting experience to expand this reflection to the whole school community. The visiting planning was taken care of in detail and involved all the trainees, but also the other professional resources of the Institute. It turned out to be a formative situation in which all the actors involved were “in learning”. It encouraged observation and reflection on the processes that the school has activated, on the reasons for the choices made, on the quality of the results. The visiting of the other schools provided the

opportunity for professional dialogue, sharing of good practices not only within the Institute, but also to draw inspiration from those of colleagues from other school. The activity was carried out in an atmosphere of reciprocity: it was not only observing an environment different from one's own as a guest, but also preparing to welcome others by building one's own educational structure to make it readable to new interlocutors. It was a metacognitive distancing exercise that benefited both of us (Cerini, 2019). At the methodological level, active methodologies were used (Dewey, 1938) which, with their explicit reference to cooperative methods, peerlearning, visiting in innovative schools allowed us students to have a professional exchange that led to the development of new skills. Fundamental in the work was the use of INVALSI data for a reflection on identified priorities and goals, but also for a "remodeling" of the expected process objectives. It was a process that allowed both to focus attention on the mission of the school: to offer quality education (goal 4, Agenda 2030), but also to promote the virtuous circle of evaluation-improvement-social reporting.

Keywords: expert evaluation, visiting, good practices

A community RAV

Francesco Mammarella - Roberta Franchi - Ettore D'Agostino - Carla La Vista

The Omni-comprehensive Institute of Città Sant'Angelo includes Primary, First Grade Secondary school and High School with five courses. The work analyses and proposes implementations in the use of RAV and INVALSI data for the school self- evaluation, addressing the role of the indicators and guiding questions of RAV for school self-evaluation from a methodological point of view, with the participation of the entire school community. The identification of the priorities towards which the school should direct the Improvement Plan thus becomes the result of a re-reading made by teachers (in particular newly entered teachers) of their work from a system perspective, contained in the final report and based on the questions of the RAV School Questionnaire 2022/25 and of the answers of the Questionnaire of the previous three-year period. The data contained in the reports of the teachers, together with those of the internal monitoring that involved teachers, ATA, parents and students, were then classified, systematized and summarized by the Internal Self-Evaluation Team. In order to improve the self-evaluation process through the involvement of the entire educating community, the work analyzed any inhomogeneity (or compliance) existing between the dimension of perception measured by internal monitoring addressed to the various actors and users of the school system and the dimension of the evidence that emerged from the analysis of the teachers' reports. The work of the school, in view of social reporting, therefore becomes the object of evaluation of the same social effects produced in the context of a dialogue between the school and its stakeholders in a dynamic of research and constructive and comparative exchange. The data used were: RAV for the three-year period 19/22 including INVALSI data, 2019 and 2022 questionnaire; internal monitoring promoted by the school; answers to the questions of the Rav School questionnaire formulated by each teacher for the writing of the individual year-end report. RAV and INVALSI data were therefore used both as a starting point for the evaluation cycle and as a guiding tool to guide the reflection made by teachers for the purposes of individual reporting. The dimensions analysed were those already defined in the RAV: 1) Context and Resources, 2) Outcomes, 3A) Educational and didactic Processes-Practices, 3B) Management and Organizational Processes-Practices. On the basis of the objective data of areas 1 and 2, referring to the three-year period 19/22, the NAV compared the data available to the school as internal assessments while, for areas 3A and 3B, it used the results of the reports of the teachers and the results of the monitoring promoted by the Institute. Each teacher reflected and provided evidence on the actions, implemented both individually and collectively, starting from the questions of the RAV questionnaire, also having a broad and widespread perspective as a result of an organization chart aimed at overcoming the figure of the single class coordinator in favor of a plurality of figures summarized in the references 1 (planning support to teachers), 2 (pedagogical support in relations with students and families), 3 (organizational support in inclusion processes). They, together with the representatives of civic education, those of the PCTO (for the three-year period), the instrumental functions and above all the newly entered teachers engaged in a capillary study of the actions implemented by the school, have favored types of operational dynamics still more collegial,

with a view to shared responsibility, measurable goals and adequate process objectives. The results that can be obtained from the reports of the teachers represented the dimension of the evidence of this study, to which the members of the NAV have added, for comparative purposes, the dimension of the perception that emerged from the results of the internal monitoring that explored the following Areas converging in the Areas 3A and 3B of RAV: [1] Communication, involvement, training needs (RAV areas: strategic orientation and school organization; integration with the territory and relationships with families); [2] Interpersonal relationships and well-being (RAV areas: Inclusion and differentiation; Development and enhancement of human resources); [3] Didactic planning and methodologies (RAV areas: Curriculum, planning and evaluation; Learning environments). [4] Furthermore, in relation to the digital revolution operated by the school as a response to the pandemic emergency, the survey aimed at the school community measured the degree of satisfaction and any critical issues related to the DAD which represents the Area [4] of our study with a view to the digital skills that will be monitored in 2023 in the lower secondary school. The analysis of internal monitoring shows a medium-high degree of satisfaction in the areas of interpersonal relations by all respondents; however, there is a discrepancy in the perception that students, parents and teachers have about the actions promoted by the school to support students in overcoming relational difficulties such as shyness or arrogance. Parents and teachers, in fact, show a high recognition of the commitment made by the school in this area, while for students the school does not fully satisfy their emotional-relational needs. In this context, the school has promoted initiatives such as meetings with the Institute psychologist and "support teachers working as subject teachers", as well as interventions for specific categories of students with special educational needs such as the use of the Cosmiicf platform for sharing IEPs and Inclusion team for sharing PDPs. However, these actions seem to address a narrow and specific target and do not embrace the entire student community, except in the case of the Institute psychologist who intervened in many situations but was obviously unable to undesrtand and collect the listening needs that may be present but non showed and the Institute newspaper L'Angolino which favors inclusive dynamics. From this derives the need for the Class Council to strengthen its functions of analysis of the subjective and objective starting data with a more careful and systematic monitoring of the present situations of discomfort. The positive response of parents on this question could, on the other hand, be linked to the fact that families were invited to participate massively in the life of the school, thanks also to the presence of the Parents Committee which further favored the participation of families in the action. education and training of children, and to the direct channel of communication between families and the Headmaster, strongly desired by the latter. A conflicting aspect that emerged in the area of didactic planning and methodologies, between the perception of students and the concrete actions implemented by the school, concerns self-evaluation which for students is not adequately integrated into the school's educational and training process. The school has activated forms of self-assessment based on INVALSI frameworks in relation to language and mathematical skills, already from the welcome phases, and with ongoing initiatives such as INVALSI Training Testing 2021 and the analysis of INVALSI questionnaires administered in previous years. Another action promoted in this sense was the implementation of formative evaluation which allows students to focus more on the learning process and its improvement rather than on results. The sharing of the evaluation criteria with the students and the reflection promoted in the classes on these criteria also intended to enhance the self-evaluation capacity of the students. Despite this, the dissatisfaction shown by the students in relation to what the school has implemented to strengthen the self-evaluation dynamics requires the school to understand what the students mean by self-evaluation, whether a simple participation in the assignment of the grade or a self-analysis tool for the strengthening of the metacognition of the self in order to act accordingly. In the area of communication, involvement and training needs, the request for improvement of the English language seems to be shared by students regardless of the degree and course of study followed and, as emerges from the reports, is satisfied by the school through the activation of courses, certifications, CLIL modules and activities such as “International interviews” and participation in European projects, which however do not seem to be sufficient for students to meet their needs. The NAV has interpreted this need as a direct consequence of the numerous internationalization activities promoted by the school which have made students aware of the need to achieve a linguistic competence that allows them to fully benefit from the opportunities for personal and educational growth associated with the development of multilingual and metalinguistic skills. With regard to the Integrated Digital Education area, students consider it less effective and more demanding, but also recognize that it contributes to other general and transversally expendable skills related to the use of IT and digital tools. In addition to the data mentioned, the work presents the analysis of numerous other interesting parameters for the purposes of the Improvement Plan, as well as a shared reflection on the possible reasons for the

misalignment between the dimension of perception and the dimension of the evidence that emerges in some areas.

Keywords: self-evaluation, RAV, INVALSI, indicators

From monitoring to social reporting: a possible toolbox

Angela Rita Fisichella - Santina Rita Forforelli - Amalia Panebianco - Sonia Salfo

The research conducted stems from the need to create a model for monitoring the PTOF, and the PDM in particular, that makes it possible to verify the evidence to be included in Social Reporting. The research was conducted in the educational field at the Istituto Comprensivo G. Caruano di Vittoria (Ragusa) during the three-year period 2019/22. In particular, RAV (Self-Assessment Report) and the PTOF (Three-Year Plan of Educational Offerings) were the object of reflection. Within the PTOF, the Training Plan, the Inclusion Plan, and the Integrated Digital Teaching Plan were examined. The study was directed to promote reflection within the Institute Staff and to develop a working method for ongoing monitoring. Starting from the analysis of the Institute's documents, we moved on to constant updating over the course of the three-year period, taking care to analyze data from monitoring. The first year saw us deal with lockdown and the health emergency, which highlighted the need to implement easy-to-manage tools for most staff. The digital, GSuite tools made the monitoring processes faster, and they came fully into daily use, effectively making a panel of tools defined and easy to approach even for novices. The second year saw the development of shared tools among the system figures of the PTOF areas. The Staff has, thus, acquired a systemic working method aimed at accountability. The tools were intended for the collection of quantitative and qualitative data, which would highlight evidence, both of strengths and weaknesses with a view to improvement that would have a cyclical form. INVALSI data , their analysis were the subject of attention and reflection, including through a training course aimed at elementary school teachers, in order to support the verification of evidence, the constant monitoring of learning outcomes, the trend over the years. At the conclusion of the third year, the need was felt to verify what was collected, produced and verified. Therefore, evidence was verified in all areas of the RAV in order to verify its progress over the three-year period, prepare social reporting for the 2019/22 three-year period, and draft the Self-Assessment Report for the 2022/25 three-year period. The methodological approaches took into account the realist perspective and the idealist perspective. This methodology allowed for fruitful reflection on what was monitored in terms of both quantity and quality. The fields of inquiry included: school performance, instructional processes, instructional design, assessment, and the use of digital technologies. Of course, given that this is an educational field and the verification of the quality of teaching and learning processes, the qualitative aspects were preferred in evidence, deepening the process of implementation and public evidence. The final framework returned data useful for the drafting of Social Reporting (referring to the three-year period 2019/22), implicit and explicit hypotheses useful for the drafting of the RAV 2022/25. In conclusion: the tools made and used proved to be effective in guiding the evaluation of outcomes and processes, and will be useful in guiding the definition of the medium-to-long term process objectives of the 2022/25 triennium. As much as the work returned a clear and well-contextualized picture, there was a desire to see if the results could be considered good practice and, more importantly, repeatable in other school contexts. For this reason, a study and work group was formed that, in addition to shared professional interests, has already experienced the method of action-research in the educational field, especially in the assessment of learning starting with INVALSI tests. The long confrontation, verification of data, actions and teaching and organizational practices has been long but at the same time fruitful. Fruitful because it revealed critical and strong points of the working method, tools and verification of evidence. After all, in the educational field, confrontation and sharing constitute the real strength of professional communities of practice, both formal and informal. So we have come up with a possible toolbox, as we wanted to name it, which is not meant to be the solution but a first approach to systematize a method of reporting similar to that of the RAV and PTOF, which see the use of a guided platform to be filled out. The need to systematize a common tool stems from the fact that very often the teachers involved in the Staff are involved in mobility for personal reasons or due to the conclusion of their professional careers, so schools find themselves having to provide new teachers with the training necessary

to share a common project and method of work. Also being able to manage the same or similar tools between schools would succeed in creating territorial networks of schools that, over time, could share a common reading of INVALSI data, with the sole purpose of improving teaching practices and not comparing, as could happen. The tools made are: masks for PTOF monitoring, reflection and observation grids, focus group schemes, platform for collecting evidence, etc. Of course, this work does not pretend to be exhaustive, but rather to represent a moment of shared reflection from which to start again in order to create tools that can make the process of social reporting more effective and long-lasting, which cannot disregard the verification of the work of each autonomous school.

Keywords: self-evaluation, improvement, system reporting

THEME 5. THE USE OF INVALSI DATA AND MATERIAL TO IMPROVE TEACHING

ORGANIZER: INVALSI

COORDINATOR: STEFANIA POZIO

OCTOBER 30TH: 2.00 P.M. – 4.00 P.M. {ROOM 1 ANNAMARIA – TEACHING 10}

Teacher but what does it mean here? Linguistic considerations on INVALSI math questions for Primary School

Chiara Saletti - Fabio Brunelli - Ivan Graziani

How much does text comprehension weigh in the outcome of math tests? "The construction of mathematical thinking is a long and progressive process in which concepts, skills, competencies and attitudes are found, interwoven, consolidated and developed over and over again; it is a process that also involves linguistic difficulties and requires gradual acquisition of mathematical language. Characteristic of mathematical practice is problem solving, which should be understood as authentic and meaningful questions related to everyday life, and not just repetitive exercises or questions that are answered simply by remembering a definition or a rule" (MIUR, 2012). Comprehension of the text is the first stage of the solving process (Polya, 2016), and often there seems to be a lack of effective reconstruction of the problem situation either because of difficulties in comprehension or because comprehension is given up. "Sometimes, however, the behaviors enacted by children when faced with verbal problems seem to testify to an a priori renunciation of comprehension, as the strategies used seem to disregard comprehension of the text" (Zan, 2016). The attitude of renunciation triggers a series of "pathological" behaviors that accompany problem solving: finding the numbers in the text and doing the sum, trying to guess the operation, looking at the numbers and from those tracing back to the right operation trying all the operations and choosing based on the result, looking for key words, deciding whether the result should be greater or less than the given numbers and choosing the operation accordingly, and to finish at random! Of paramount importance, therefore, is teaching problem solving at the primary and secondary school levels: this objective has been present since the 1985 Programs and is also reiterated in the 2012 National Directions, but it is one of the most critical aspects of mathematics teaching, both because students develop a kind of revulsion and fear of mistakes and because the teacher in the first cycle makes them do activities called problems but which are actually exercises related more to reproductive than productive aspects. The teacher typically explains, shows students a number of times how to do certain things and then asks them to do them again. But what she proposes are not problems but rather exercises that stimulate reproductive thinking without stimulating productive thinking at all. Bruno D'Amore in this regard says, "Let's talk about that certain repetitive school practice according to which in order to get a certain type of strategies for solving a class of problems or exercises well understood (for example) it is necessary to make the class do the same exercise several times. In the memory of some of us there is a fixed memory of intellectual mortification and a vague idea of the futility and stupidity of this way of doing things." Behind this attitude on the part of the teacher is, perhaps, the fear of not getting to the bottom of...what?! as if his or her goal is to teach problem solving and later make people solve problems, rather than to teach problem solving, the real goal that the mathematics teacher should pursue. The guidance document for the writing of the Italian test in the final exam of the first cycle (Working Group appointed by DM July 10, 2017, No. 499) states, "... if one thinks that arguing is, like storytelling, a primary linguistic act, one must recognize that this act is linked to the elementary needs of every student. He argues in simple forms the child who gives reasons for his option; he argues in more articulate, but still elementary, forms the student who tries to justify his choices." These definitions and statements are very close to mathematics and to the demands we put on our pupils in arguing their solution procedures in our scientific problem solving workshops. Many researchers have made valuable contributions (Viale-Giberti 2020) that have accompanied our reflection on language. Language proficiency, considered one of the basic skills that schools must develop, "consists of the well-structured possession of a language along with the ability to use it for various purposes" (INVALSI Italian QDR, 2018); among the skills that pertain to language proficiency are reading and comprehension. How much then of the linguistic component, understood as comprehension of a written text, and of the wording of the question itself really affects the resolution of a mathematical question? How important is it, especially for primary children, to reconstruct precisely from the text and context the set of information, to make inferences by deriving

information left implicit in the text, but relevant to its understanding? How important is it to grasp the elements of cohesion, e.g., connectives, and their contribution to the construction of meanings in the text? What is considered a skill specific to Italian is actually a cross-curricular tool that enables us to succeed better in other disciplines as well: reading a text of a math problem is not enough, for it to be solved correctly it must be understood. Everyday language (Di Martino, 2015) is also involved in teaching any discipline, including mathematics. Language competence is therefore an essential part of mathematical competence. We have been reflecting for some time on INVALSI tests as a useful teaching tool and the most common mistakes made by pupils to understand the complex mechanisms of learning. In this contribution, we have examined some questions from INVALSI mathematics dossiers offered to second- and fifth-grade Primary School students that we found interesting from the point of view of text comprehension, which we modified by making them open-ended, or changing the distractors or some of the words. For our research and classroom work, we chose fifth-grade primary, first-grade secondary students in some schools in the regions of Emilia-Romagna and Tuscany. Before moving on to the operational phase of our research, we asked the students and teachers of the classes involved to give us a definition of the word problem, regardless of the mathematical context; we also asked the students about the meaning of some recurring words in mathematical problems, and only afterwards we also asked them about the fact that sometimes the text and its understanding adds difficulty in solving a mathematical problem. After an analysis from the linguistic point of view of the selected items, we handed the booklet to the students without any time limit but asked them to argue in writing the reasoning followed to arrive at the given answer, also pointing out any critical issues encountered especially from the point of view of linguistic comprehension; all this was then subject to sharing and discussion. We then re-submitted the same items with our modifications to see if this way the question was addressed differently. The purpose of our research was to see how much the text of a question could be a concrete obstacle to answering the question asked. For this, the students had the opportunity to express their perplexities, either by arguing their doubts, or by underlining certain terms and commenting alongside the question what the issue related to them was. The contribution puts under a magnifying glass the difference between learning how to solve a problem and learning how to deal with a problem; the difficulties our students face in understanding the text of a problem and the mistakes that are not always used as a resource; the fears and misconceptions that arise and that risk affecting learning; and the importance of devoting even more time to problem solving and argumentation-a complex but indispensable process for structured learning. In fact, many problems are proposed not so much to be solved as to be addressed. The value of a problem lies not so much in finding its solution as in the ideas it raises in those who tackle it and the attempts put into it.

Keywords: tasks, comprehension, Mathematics, Italian, didactics, argumentation

Understanding Students' Errors in mathematics: a comparison between 2015 and 2019 TIMSS cycles at eighth grade

Francesco Annunziata

A crucial aspect of teaching and learning mathematics is the analysis of student error; such analysis allows for reflection on strategies that can be implemented to improve mathematics teaching. Russell and Masters (2009), in a paper presented at the annual meeting of the American Education Research Association, highlighted that when analyzing errors, teachers may neglect students' conceptual understanding in favor of procedural correction. Ketterlin-Geller and Yovanoff (2009) also noted that teachers may have difficulty distinguishing between a "lapsus" error and a "bug" error. The former, lapsus, are random errors in students' procedural knowledge and are not the result of inherent misunderstandings concerning the specific topic. Bugs, on the other hand, represent students' misconceptions about specific mathematical subject knowledge or skills that consistently interfere with the demonstration of their abilities. The main goal of the analysis of students' errors is to bring out the type of reasoning that led to that error. Ketterlin-Geller and Yovanoff (2009) conducted an analysis of students' mistakes (or "bugs"), based on their failure to understand the stimulus or procedures to be implemented. Specifically, the authors proposed the approach of "cognitive diagnostic measurement" based on the decision-making processes enacted by

students. It is based on cognitive models of learning to determine students' persistent cognitive errors and to understand the pre-skills and knowledge needed to solve a problem correctly. In the present study, the results of the TIMSS (Trends in International Mathematics and Science Study) 2015 and 2019 international surveys were used to investigate the types of errors made by students in mathematics. The TIMSS survey, promoted by the IEA (International Association for the Evaluation of Educational Achievement), investigates student learning in Mathematics and Science in the fourth and eighth grades. Conducted every four years, with Italy's participation since the first cycle, the survey allows studying the evolution over time of the results of the same cohort of students from fourth to eighth grade. In TIMSS 2015 and TIMSS 2019, the Italian performance in mathematics for eighth grade is in line with the international mean with an average score of 494 points in 2015 and 497 points in 2019. Four content domains are investigated in TIMSS eight-grade: number, algebra, geometry, data and probability. In both cycles of the TIMSS, the Italian results showed students' weakness in algebra while geometry was a strength, number and data and probability domains did not differ significantly from the main scale. The present study is part of the line of research aimed at studying Italian students' responses to large-scale surveys (Bassani et al., 2012; Bolondi et al., 2021; Ferretti et al., 2016; Pozio, 2011; 2013) and investigates the types of errors made by students in mathematics through a qualitative analysis of the open-ended responses given by Italian 8th grade students in the TIMSS 2015 and TIMSS 2019 surveys. Open-ended questions allow for a greater understanding of the resolution strategies underlying students' responses and more accurately define possible reasons for errors, and the objective of this study was to verify whether these responses were related to bug errors, i.e., misunderstanding of the stimulus and the procedures to be implemented, rather than to lapsus errors. Starting from the reading of the open-ended questions, which account for 40 percent of the total questions, among the ones made public by the international consortium and categorized in the cognitive processes of Reasoning and Apply, two questions from algebra and two from geometry – present both in 2015 and 2019 – were considered. The choice of which open-ended questions to consider was based on the criteria for the coding of students' responses, i.e., the process of classifying open-ended responses into predetermined categories that leads to the assignment of a code used to score them. It was therefore decided to target those items for which there is a significant number of different codes to be assigned to wrong answers during the scoring activity, to have a baseline picture of the most common errors and misconceptions. The wrong answers were divided into further conceptual categories, within which additional classification was made according to the type of error. Starting from TIMSS 2015 and 2019 results, qualitative analysis of incorrect answers was carried out by reading the answers to open-ended questions which were scored by a team of scorers experienced in mathematics and classified as "incorrect answers." According to the definitions in the TIMSS Framework (Mullis & Martin, 2013), to answer the questions correctly, the student must not only know the content of the mathematics but also demonstrate a range of cognitive skills. In this paper, I decided to limit the analysis to questions related only to the cognitive domain of reasoning and apply. The results obtained were evaluated in relation to the geographic macro-area in which the sampled schools are located and to the student's gender, to assess possible significant differences within these categories and to try to provide possible insights for the teaching and learning of the subject that may be useful for overcoming students' difficulties.

Keywords: TIMSS, geometry, algebra, qualitative analysis, mathematics education, lower secondary school

The language of INVALSI Mathematics tests of grade 8

Ottavio Giulio Rizzo

INVALSI Mathematics tests are for the most part "world problems," that is., "a text (typically containing quantitative information) that describes a situation assumed familiar to the reader and poses a quantitative question, an answer to which can be derived by mathematical operations performed on the data provided in the text, or otherwise inferred" (Greer et al., 2002). World problems strive to make a mathematical question more relevant to the student (though world problems do not always manage to do so, given the ontological category of "[senseless] mathematical problems," see: Zan, 2017) but the addition of a natural language layer could introduce a further obstacle to comprehension if the language used in the world

problem is not clear enough to the student. This is particular relevant from an inclusiveness perspective, since disadvantaged students will often not have Italian as mother tongue (be it a local dialect or a foreign language). On the other hand, we noticeably have the need that "an individual" — and henceforth a student — "should be able to reason mathematically, understand mathematical proof and communicate in mathematical language" (Council of the European Union, 2018). The language of mathematics, that is, has to be clear to students. Clearness of language has many different components, amongst which a most relevant one is vocabulary: do students actually understand the meaning of all the words in the problem? De Mauro (2019) recognizes a "fundamental core" of 2000 Italian words, which any functional speaker of the language can be supposed to command; 3000 "high frequency" words, which occur often in the spoken or written language; 2500 "high availability" words, that albeit not appearing frequently are usually familiar to native speakers (e.g., "pepper"). Following De Mauro, we call these 7500 words the "basic" Italian vocabulary, to which we have to add 33,000 "common" words (and some 220,000 regional, poetical, specialistic or obsolete words). The Italian school system does not have an official set of words that have to be known at a given grade, but the introduction to De Mauro's fundamental core points out that it is not unreasonable to consider the basic 7500 word vocabulary as commonly known at grade 8. Toth (2021) analyses the word frequency of basic and common vocabulary in INVALSI Italian tests at grade 5, 8 and 10 and finds that word frequency does not correlate with the difficulty levels: this fact is partially surprising, and Toth suggests that further inquiries are needed on students' vocabulary to understand the phenomenon. Finally, Ferrari (2021) hypothesizes that "part of learning difficulties in Mathematics are of linguistic origin". In this contribution, thus, we want to answer the question: does word fequency explain part of the difficulty level of Mathematics tests? We compare the top 5% and the bottom 5% of INVALSI mathematics items at grade 8 as ranked by number of correct answers to verify if there is a significant vocabulary difference. As source data we used the corpus of INVALSI Mathematics tests of grade 8, which we analysed in full in order to recognize the basic mathematical vocabulary. Collected and sorted words were processed by hand to remove proper names and mathematical non-words (e.g., ABCD in "the square ABCD") and later stemmed using the SnowBall (Porter, 1980) library and finally post-processed by hand to merge stemmings. This shows that some technical words like "diagonal" or "perimeter" while not appearing in De Mauro "basic" vocabulary should be considered part of a "mathematical basic" vocabulary. Data show that 97% of the words used both in the top 5% and the bottom 5% belong to the basic vocabulary, with the fundamental core covering respectively 84% and 87%. This answers negatively the research question. Data show also that Mathematics tests make much more use of the basic vocabulary than the Italian tests: Toth (2021) reports a value around 60% for grade 8. We infer from these numbers that the Mathematics tests, at least in grade 8, have been built with a great linguistic care of avoiding words that could bothersome to some students. It remains to apply the same techniques to the other available tests to confirm this fact. An interesting off products of this work is the building of a "basic mathematical vocabulary" for each given grade.

Keywords: language and mathematics, inclusion, educational research

Teachers' beliefs on the origin of mistakes in the mathematics INVALSI tests of grade 5

Annarita Monaco - Barbara Balconi - Ottavio Giulio Rizzo

What do grade 5 primary school mathematics teachers think about their students' mistakes in INVALSI tests? In 2020, a mixed group of researchers in pedagogy, mathematics and computer science education, together with teacher–researchers, shared the common goal of investigating teachers' attitudes and beliefs about INVALSI tests, about the causes of students' mistakes and about the use of tests in daily teaching. The research team designed and later administered a questionnaire to 526 fifth grade primary school mathematics teachers who reside and work in various Italian regions. The questionnaire administered to teachers, and already extensively described in several publications (Arzarello & Ferretti, 2021; Rizzo et al., 2021; Vaccaro et al., 2021), consists of three sections: the first is about mathematics teaching—how teachers interpret INVALSI items and their results; the second section is aimed at investigating teachers'

beliefs and attitudes about the tests and how they spill over into teaching practices; the third section consists of questions regarding teachers' professional training, or concerning personal and contextual data. This paper examines the first section of the questionnaire and focuses the analysis on those questions aimed to investigate teachers' awareness of the origin of their students' errors, considering them as a potential resource for rethinking teaching practices and as a useful step in building meaningful learning processes for students. In order to understand the level of awareness on the origin of students' errors, teachers were asked to hypothesize a reason for the cause of the distribution of responses to some INVALSI items. Specifically, the items considered in this paper are numbers 3, 9, 15, and 20 which, within the questionnaire, have the following structure: reproduction of the text of INVALSI question in its original wording (more specifically, in question 3 INVALSI item D9 from grade 5 in 2013; in question 9 item D3 from grade 6 in 2012; in question 15 item D25 from grade 6 in 2012; in question 20 item D32 from grade 5 in 2016); presentation of percentages of the distribution of learners' responses nationwide; request to identify the (prevailing) reason for the distribution of pupils' responses by choosing between some closed answers, selected by the research team, and an "Other" item that allowed respondents to make their ideas explicit. As already pointed out by Vaccaro, Faggiano, Ferretti (2021), the results of the questionnaire show teachers' difficulties in identifying the reasons for students' errors: only 5 teachers, 1% of the total, correctly interpret the reasons for students' errors for all four questions. 33.8% can identify only one of the possible reasons. Moreover, Vaccaro, Faggiano and Ferretti point out as significant how frequently teachers select students' misunderstanding of the text as a reason for their errors. This finding, on the one hand, confirms what Weiner (1985) noted as a tendency for the spectators of a phenomenon—the teacher, in the case under inquire—to attribute the causes of a possible error to the actor's responsibility—the pupil, in our case; on the other hand, it makes it clear that teachers have a need for a specific training on text comprehension as a didactical tool. In particular, this shows the importance of analyzing what was entered in the free field "OTHER" when teachers did not make use of the closed answers provided by the questionnaire, proposing a narrative response detailing their arguments with respect to the origin of students' errors. From a methodological point of view, the open-ended responses provided by the teachers became a textual corpus whose coding was carried out by two researchers (an educationalist and a mathematics educator) and a teacher-researcher, who independently tagged the causes of error. The tags that have been used are: Pupils, Teaching, INVALSI. Whenever a teacher answers could be reconducted to multiple origins, the prevailing one was assigned. At the following step, the three researchers used consensus to harmonize the tagging. The proposed analysis is inspired by the classification found in D'Amore, Fandiño Pinilla, Marazzani, Sbaragli (2008) which identifies three types of obstacles that the student may encounter in the process of knowledge construction: ontogenetic, didactic and epistemological. In summary, obstacles defined as ontogenetic are related to the students, their nature and the nature of their learning; didactic obstacles are mainly related to the teacher's methodological choices; and epistemological obstacles refer to the disciplinary foundations of the subject in question. The "Pupils" tag can thus be traced—according to the classification we presented—to ontogenetic obstacles, the "Teaching" tag refers to the teacher's teaching practices, while INVALSI tag reflects the epistemic conception of the discipline that is made visible in the wording of the item proposed in the tests. The numerosity of the OTHER responses is not particularly significant from a quantitative point of view (there are 50 responses to item 3, 34 to item 9, 33 to item 15, and 42 to item 20); it becomes interesting, however, to explore this data both to value and recognize the thinking of the teachers who included a deliberately "different" comment, but also to have a broader observatory of what are the teachers' conceptions related to the origins of students' errors. In addition, some of the responses given by the lecturers appear to stem from omissions in the closed answer options provided by the research team within the questionnaire. In this sense, the analyzed responses turned out to be a suggestion for the revision—currently in progress—of the instrument itself. About the four questions analyzed: in items 3 and 20 the dominant tag identifying the possible cause of the error committed is Pupils, in item 9 it is INVALSI, and in item 20 it is Teaching. This first summary outcome also recalls the tendency on the part of teachers to devolve responsibility with respect to error (Weiner; 1985). The analysis of the teachers' open-ended responses, on the one hand confirms the difficulties in identifying the actual reasons for students' mistakes (Vaccaro, Faggiano, Ferretti; 2021) highlighting the need to propose training interventions that can support the design of more conscious teaching actions, and on the other hand led the entire research team to question themselves on the need of further research developments, especially by adopting a qualitative approach. If the cause of error is primarily attributed to pupils, which representation of the teaching-learning process can we infer on the part of the teachers? In which way identifying the cause of errors as Teaching can activate a systematic and conscious reflection on

the teaching practices that are put in place? How can the attribution of the possible causes of errors to Invalsi be turned into a useful practice to support a proactive use of tests in teachers' daily teaching? A further noteworthy phenomenon in the analysis of the research processes is that disagreements in the tagging activity were predominantly—62% on average—between the two researchers on the one hand and the research teacher on the other: disagreements were never resolved by majority vote but by consensus processing (on average 17% of the time the minority opinion prevailed). This fact, regardless of its origin whose discussion would require a more in-depth study, highlights the importance of the interaction between researchers and research teachers in a qualitative analysis, in particular if it regards teachers' beliefs.

Keywords: know practical, errors, didactic

THEME 10. TALENTS IN THE SCHOOL SYSTEM

ORGANIZER: INVALSI

COORDINATOR: LORENZO MARAVIGLIA

OCTOBER 30TH: 2.00 P.M. – 4.00 P.M. {ROOM 2 GIULIA – TEACHING 11}

HIGH ACHIEVING STUDENTS Some considerations through literature, teachers opinions and both national and international standardized student testing

Paolo Barabanti

High achieving students have long been a marginal issue within the wider debate on learning processes in the Italian school system. The matter of the democratization of studies and the increasing attention to a school able to welcome all students and "not to leave any student behind", in order to provide minimum learning standards, have been prioritized and have left little room for other issues. In recent years, however, a multidimensional concept of equity has been proposed: the focus on equal opportunities in education has led to broaden the perspective to all kinds of diversity and individual differences (Benadusi & Niceforo, 2010). Therefore, in addition to the constitutional duty to help weak students, there is also an institutional duty to promote the "right to excellence" in order to exploit the potential of the most talented students and not to waste their resources, useful for the whole community (OECD, 2009; Besozzi, 2017). Since some OECD studies, thanks to PISA surveys, which have dedicated a specific attention to the so-called "resilient students" – that is, students who, despite the disadvantaged family background, are able to achieve high results – in Italy a tentative research branch has been developed to shed light on this phenomenon. On the one hand, theoretical studies have been developed in order to try to define and identify the characteristic of high achieving students; on the other hand, some empirical research in local contexts have tried to open new opportunities, even about pupils who succeed in school despite the highly disadvantaged conditions (Barabanti, 2018; Santagati, 2019). This paper has two aims. The aim of the first theoretical part of the study, starting from the literature, is to offer a few comments in order to try to identify the characteristics of high achieving students. Although, currently, there isn't a common definition, the views of teachers, school leaders and students suggest a "plural" idea of excellence in which particular cognitive and performance skills are combined with certain behavioural characteristics, attitudes and orientations (Barabanti, 2018; Santagati, 2019); this emerging identikit reflects overall the characteristics of "good students" already highlighted by Parsons about half a century ago (Parsons, 1972). Suggesting a classification widespread in recent years, the most shared idea is one that considers the high achieving student, at the same time, the one who has both cognitive skills and soft skills, qualities that have both important effects on education and on transition to the labour market (Heckman & Kautz, 2012; Giancola & Lovecchio, 2018; Maccarini, 2019). The second part of the work wants to highlight whether – and how – it is possible to investigate this group of students by data from some national and international surveys. For this second empirical objective both INVALSI tests data (administered in school years 2018/19 and 2020/21) and OECD-PISA data (edition 2018) will be used in addition to their corresponding student questionnaires. The cognitive dimension of excellence can be operationalized by referring to the top performers, namely: • In INVALSI tests, students who reach the highest level (which is level 5) in Italian or Maths test, at grade 8, 10 and 13 (these are the only grades for which each pupil is associated with a skill level); • In OECD-PISA tests, students who reach level 5 or level 6 (the highest ones) in one of the three literacies assessed (reading, mathematics or science). The second dimension may eventually be highlighted if, with sets of items of the student questionnaire, it is possible to construct some indices concerning some of the skills about emotional-relational-social dimensions. The dimension of excellence related to hard skills is more easily quantifiable and measurable; it's the matter of several large-scale standardized surveys at national and international level actually (Viteritti, 2018). Analyzing INVALSI tests data, the amount of top performers varies among tests and, more importantly, among different territorial aggregates. There are fewer students who reach level 5 in the Italian INVALSI test rather than in the Mathematics one. In northern Italy, in all the tests and in each school grade considered, amounts of top performers are above the national average, while the situation is exactly reversed in southern Italy. Student gender and citizenship also affect performances: there are more girls at level 5 in the Italian test while there's a larger share among males in the Maths one and, furthermore, native pupils are more present than the second generations (the first

generations even less present). OECD-PISA 2018 survey data reveal a heterogeneity among top performers in EU countries. Italy is overall struggling to keep up with the EU average (especially in Science) and it is far from the quotas of some virtuous countries (such as Finland, Estonia, Poland and Germany). Unlike hard skills, soft skills are more difficult to operationalize (Di Francesco et al., 2015), although OECD are making trials to measure socio-emotional skills, with a consequent impact on public opinion and on school stakeholders (Previtali, 2021). Nowadays, the student questionnaire is a useful tool (although it's self-administered) to investigate the socio-emotional dimension because it contains some sets of items in order to know come students' characteristics by means of personal and context (family and school background) variables. However, about INVALSI tests, the last viable questionnaire for this purpose was the one administered in school year 2014/15 (in grades 5 and 10) because, in successive surveys, questions were almost exclusively limited to gathering variables to construct the so-called ESCS index, that is socio-economic and cultural status index; on the other hand, with a comprehensive questionnaire it would be possible to construct indices related to motivation and commitment, well-being and relationships at school, interest in school subjects. OECD-PISA 2018 survey, however, as for previous editions, still gather sets of questions that helps to construct some indices (already provided in the downloadable dataset) useful for the identification of certain students' soft skills, including: motivation to learning goals and to master tasks, positive feelings, sense of self-efficacy, student co-operation and sense of belonging. The combined use of these results from both standardized tests and student questionnaire would allow to take into account both the components (cognitive and social ones) necessary to consider a student excellent.

Keywords: high achieving students, equity, hard skills, soft skills, INVALSI tests, OECD-PISA tests

Top performers: characteristics and territorial distribution. An analysis based on the latest INVALSI results

Michele Cardone - Emiliano Campodifiori

Introduction – A remark in the last INVALSI report was about the so-called top performer students: in fact, an inclusive school cannot avoid to consider all the aspects of the same phenomenon – both helping the students with difficulties by trying to improve their skills, and giving value to those students who are particularly good; only in this way we can talk about a fair school at 360 degrees. Furthermore, if we focus exclusively on the weaker students, the risk is that we might limit the country's economic and social development.
Object - What are the elements that characterize top performer students? Is it true that they belong to certain social classes and to certain areas of the country? The aim of this paper is to answer these questions, trying to characterize the top performers and to contextualize them at a social and geographical level. Another goal/aim/purpose of this paper, however, is also to investigate the determinants of this educational success, using variables such as the student's personal characteristics, the geographical setting, and some questions the student has to answer at the end of the cognitive tests in Italian language and Mathematics.
Data – The data used are those related to the results and to the student questionnaire of the last year of secondary school of the 2021-2022 school year, that allow to observe and analyze the phenomenon at the student detail and with a territorial detail that reaches each individual school. The information from the student questionnaire a remarkable informative heritage because it allows to investigate some aspects of the student's life, despite not having the full coverage unlike the tests (around 10% missing).
Results – The definition of top performer used in this work is that one obtained by the cognitive tests performances: all those students who reach a competence level of 4 in Italian language and Mathematics, a level of B2 in the English (both Listening and Reading test). A first descriptive overview shows the disomogeneity in the distribution of those students: 1 out of 4 in Valle D'Aosta, Trento and Friuli regions is a top performer, while in all the southern regions this percentage is below 10%. Other characteristics strongly related to those top performers are the socio-economic background, or ESCS (top performers with "high" ESCS are 4 times those with a "low" ESCS), the school type (in Lyceums they're 21% while only 0,7% in vocational schools), migratory origin and being a repeating student or not. Thanks to the student questionnaire we can cross other information: the strongest association is with the grade obtained at the end of middle school: from the 1% of those students with a grade of 6 to the 48% of those having "10 and

laude". Then "books at home": top performers are 2,3% among those who declare few books, whole they are 28% among those who declare more than 200 books at home. As for the possession of goods at home, it is interesting to note that those most associated with excellence are "pc" and "internet" first of all, then a "desk" for the homeworks (much more than "a quiet place to study" and above all with respect to "a room of your own" whose presence has no influence at all). Among the new items introduced this year, "educational software", "technical manuals" and "artworks" are hardly associated, while the "dictionary" and above all "classic literature books" are associated to excellence to a much greater extent. We then continue with a logistic regression model, considering only some variables as predictors of being a top performer as defined in this paper.

Keywords: top performers, standardized tests, competences

THEME 7. THE COVID-19 PANDEMIC AND THE EFFECTS ON SCHOOL RESULTS

ORGANIZER: INVALSI

COORDINATOR: NICOLA CHIRIANO

OCTOBER 30TH: 2.00 P.M. – 4.00 P.M. {ROOM 3 LUDOVICA – TEACHING 12}

Distance education (DAD) and distance education links (LEAD) during the lockdown: how much did they affect the children of kindergarten? Is there a relationship with the percentage increase in band 1 for grade 2 in the Marche Region?

Carmina Laura Giovanna Pinto

The COVID-19 emergency deprived girls and boys with the sudden and prolonged interruption of activities in the presence in schools of childhood not only of educational experiences but also of relationship experiences with classmates and teachers. To fill this void instead of and / or as a supplement to distance learning (DAD), distance learning links (LEAD) have been proposed to boys and girls. The challenge was to maintain, albeit at a distance, the contact and relationship necessary for a balanced growth of the girls and boys, trying to restore and re-propose the modalities relating to the educational links typical of face-to-face contacts. In distance communication only the verbal modality reached its destination, while the non-verbal and paraverbal modalities were absent, which more than the verbal one create that emotional and emotional bond that is a prerequisite for a peaceful learning. The first socialization for secondary ties takes place for girls and boys in preschool environments which are spaces of multiple relationships, in which they explore, experience, learn to move independently and orient themselves by making their first experiences of logical - mathematical knowledge and 3D geometry. Movement and the physical experience that accompanies it are the conditions for the acquisition of skills such as the placement in space of the child himself, of the objects that surround him, of others; the Orientation in time of moments of daily life, of the recent past, of the near future; Knowledge and operational skills are developed through manipulation and familiarization with the strategies of counting and working with numbers and through group play and simulation games (let's pretend ...). A screen can never replace depth nor can it offer the experience of manipulation that is a prerequisite for conceptual abstraction. Hence the hypothesis that the low levels of performance in mathematics by children in the second primary grade may be connected with the lack of adequate interactions with physical rather than virtual reality. Another fundamental element from an educational point of view is time, which with its phases and rhythms in the activities that together with the physical spaces / environments constitutes the prerequisite for the cognitive development of the child: the lockdown has also redesigned time and its rhythms that for such young children they are essential for their own cognitive ecosystem. Time and space as a whole are the dimensions within which the child has "the opportunity to play, fantasize, narrate, experiment, reveal and develop identity, autonomy and skills", and neither the DAD nor the bonds distance learning (LEAD) were able to open spaces of connection with reality that determine the framework for the development of learning in the child. It is no coincidence that the process that allows for example to know and reproduce topological relationships in the five-year-old child is the result of a slow process that goes through the manipulation of various materials in the first year (three years) and then to acquire manipulative skills in the second year (four years). Well, even if the activities were carried out at home with the support of parents and on the instructions of the teachers, evidently the lack of comparison between peers, the poor interactions with the teacher have destabilized the equilibrium of the children, which in fact show in a percentage growing lack of basic skills necessary for a harmonious cognitive development. This research work aims to highlight whether there is a relationship between the percentage increase in band 1 for the grade 2 in the Marche Region for the school-year 2021/22 - compared to the previous two years lived in an epidemiological emergency - and the management of distance education and distance education links in the previous two school years. The research question aims to highlight whether there is a correlation between remote teaching methods and the management of LEADs with the low performance that characterized the surveys for post lockdawn mathematics tests for the Marche Region. Is it possible that the methods of delivery of the teaching proposals both in synchronous and asynchronously have not been adequate for a correct development of competence? INVALSI data relating to standardized grade 2 mathematics tests for school-years 2018/19, 2019/20, and 2021/22 for

Marche Region and data collected with a survey administered by USR MARCHE during the first lockdawn period from which highlight the methodologies chosen during the distance lessons. Study of the data collected during the first lockdown period to monitor the phenomenon of distance education in schools in the Marche Region. Use for the documentation and argumentation of the thesis of articles on the subject such as that of Ianes. From this research work, face-to-face teaching is strengthened especially for the weakest groups of pupils: age group 3-6, pupils with special educational needs. From a work, in fact, by Dario Ianes and Rosa on distance learning during the lockdown it is pointed out that "inclusive processes are difficult to achieve in practice and work until action is taken a variable that introduces a situation of unmanageable imbalance in the didactic context, such as ... the transition to distance learning. Therefore, distance education and distance education links (LEAD) certainly cannot replace face-to-face teaching which would seem to remain the only one suitable for encouraging world / child interaction and the only one able to offer them an experience of confrontation with children. logical mathematical aspects of the real world.

Keywords: distance, teaching, results, mathematics, Marche, LEAD

From the Invalsi Data to the Teacher Questionnaire

Monica Papini - Valeria Fortunata Tortora

Italy was the first European country where cases of COVID-19 were established, due to which schools were closed for a particularly long period: from February 24, 2020 until the end of the school year, for a total of 80 days. Even in the following school-year 2020/21, for different periods based on the geographical location of the institutions, distance education had to be used. The advent of the COVID-19 pandemic has profoundly changed our concept of schooling and teaching. Distance education (DAD) was not a choice and the use of technology was experienced by many teachers certainly not as an opportunity but as a necessary condition to avoid "complete lockdown of teaching." The availability of information and communication technology (ICT) made it possible to preserve the continuity of instruction and learning when physical interactions were no longer possible. Educational institutions have mobilized, including through substantial investments, to ensure all students' right to continuity in their educational experience; the adoption of online platforms, such as Microsoft Teams, Google Classroom, Zoom and several others, has seen exponential growth. Picking up on a very useful concept by Doucet et al. (2020), teachers and researchers actively collaborated locally to improve online teaching methods, understanding it as a real opportunity. At that juncture, cooperation among teachers has grown enormously, with forms of genuine mentoring by the more experienced ones, alongside self-training initiatives of various kinds (Pagani & Passalacqua, 2020). Training and self-training were necessary because only a small minority of teachers were ready for Distance Learning, because teacher training programs from a didactic and pedagogical point of view are still little practiced ground for Italian teachers, when compared with other European realities. The results of the 2018 Teaching and Learning International Survey (TALIS) - thus before the crisis - provide a good starting point for assessing the extent to which teachers and their students were prepared for school closures. Through the international survey sponsored by OECD, it was possible to examine how often technologies were used in the classroom before the crisis. The results obtained show that, on average, across all participating OECD countries and economies, only slightly more than half of secondary school teachers (53 percent) reported that they "frequently" or "always" allowed students to use ICT in projects or in classroom work. In Italy, this affected 47 percent of teachers, which is lower than the average for OECD countries participating in TALIS survey. So, the effort required of teachers was truly remarkable, not to mention that teachers must be very familiar with these technologies and their use for them to be effective. In Italy, 52 percent of teachers said that their formal education or training included the use of ICT for teaching, which is lower than the average for OECD countries participating in TALIS survey (56 percent). At the time of the survey, 80 percent of teachers in Italy believed they could provide support for student learning through the use of digital technologies (e.g., with computers, tablets or interactive whiteboards) "quite a bit" or "a lot," a higher percentage than the average for OECD countries participating in TALIS survey (67 percent) (OECD, 2019). School is a social environment where confrontation, collaboration and growth happen when people

experience school reality and work together. It is not a virtual environment that can replace the real one; before 2020, "digital school" was in no way part of our imagination. School is not replaced with an online environment and a teacher with a computer. Despite the considerable efforts made and the technological resources used, teachers struggled to foster their students' skill development. Pupils were even more affected than teachers by the pandemic emergency, shedding their certainty and in some cases much of their motivation to learn. The study undertaken aims to assess the effects of school closures on teaching practices in mathematics, such as the difficulty of applying cooperative learning while maintaining spacing between students, and how they have affected scores in different areas of mathematics. This study aims to estimate the impact of the pandemic and school closures in Italy during school years 2019/20 and 2020/21 on mathematics learning in different school grades. DATA The data collected through the teacher questionnaire administered to teachers in the sample schools participating in the INVALSI surveys were a valuable resource. Specifically, data from the teacher questionnaire administered to mathematics teachers before the pandemic, survey year 2018/19, and during the pandemic, school years 2020/21 and 2021/22, were used. The questionnaire consists of three sections: - one discipline-specific (how teachers interpret INVALSI tests and results); - one related to general teaching aspects (what beliefs and attitudes teachers have and how they pour them into teaching practices); - one collecting biographical and contextual information. To meet the purpose of the study, data from standardized tests administered by INVALSI in school-years 2018/19, 2020/21, and 2021/22 were analyzed. Specifically, the scores obtained by students in the areas and processes of mathematical skills. From the standpoint of data analysis, the battery of questions on the frequency of use of different teaching practices proved particularly interesting: the use of the linear regression method made it possible to investigate how much classroom practice affects students' acquisition of mathematics skills and teachers' attitudes toward competency-based teaching. Reading the data obtained from the processing allowed for interesting reflections on how mathematics is taught and learned. The questions posed to teachers through the questionnaire brought to light how much "training" activities for standardized tests decreased with the pandemic, as quantitatively there were fewer hours available to devote. Some teaching methodologies were necessarily "uprooted," and the path to skill acquisition was not always successful, to varying degrees depending on the areas of mathematics In addition, the technologies supporting teaching have changed radically and have in some cases penalized, in others favored the development of different mathematical processes. Finally, even regarding assessment methods, teachers have been forced to experiment with different ways than usual. Key words: DAD, DID, math scores, teacher professionalism, teaching practices, cooperative learning.

Keywords: DAD, DID, math scores, teacher professionalism, teaching practices, cooperative learning.

The INVALSI outcomes and the pandemic's Influence: educational consequences and effects of distance learning according cooperation between school and Prevention and Public Health Department

Alessia Cividin - Claudia Virili - Francesca Malacarne - Maria Grazia Greblo

The purpose of this paper is to analyze the effects of the COVID-19 pandemic on educational outcomes according to cooperation between schools and Prevention and Public Health Department, specifically how distance learning has affected students outcomes. The paper will look at data from 2022 national tests in Friuli Venezia Giulia region to determine how distance learning has been most affected by the pandemic and for how long. The research also focuses on civic and citizenship education and the use of mixed-methods approaches to educational research. DDI has done the extraordinary job of separating on the one hand and uniting educational moments on the other that we thought were neither combinable nor stickable, concepts that were previously unglued. What are the results of this new didactic frame? Which the new design in the school highlighted by the results of the national tests. We have lived the school in DAD and DDI intensely for two years, the research questions investigate INVALSI 2022 data with a focus and qualitative mode on the integrated digital teaching methods, mixed teaching and distance teaching in the light of the cooperation between school and Department of Prevention, a complex structure for Hygiene and Public Health in Friuli Venezia Giulia. The research intends to give a current picture of the measurement of the methods used in

the two-year period 2021/22 and the results of INVALSI national tests of Italian, mathematics and English in the Friuli-Venezia Giulia region. This research work develops an analysis of INVALSI data of the eighth grade by analyzing the possibilities of detaching and gluing teaching elements, drawing and redesigning the results of teaching. How can we conceptualize these ways of learning? What are the tools of this conceptualization useful for teaching? What effects has this new and different interface had and does it have in the school in the first cycle of education? The results of this research work develop a critical reading of the data that places the neckline and gluing of teaching elements at the center of attention, drawing and redesigning the outcomes of teaching. What impact on perception from a cognitive and social point of view? What are the tools that young people have to face an era in which their natural sociality between school walls has been canceled? The development and use of indicators of the recent phenomenon of Integrated Digital Teaching and Distance Teaching is a widespread practice at national level both in the field of school policies and in the reflection on the evaluation of learning. These indicators, useful in this survey to detect and monitor the phenomenon, need to be put into the system. The objective of this survey is to highlight the complexity of the management procedures of these teaching methods, focusing attention on the effects of the periods in presence and the periods in DDI on the results of the national evaluation 2022. To detect and analyze the effects of these phenomena on learning, INVALSI 2022 data were used and the operating procedures used during the school-years 2020/21 and 2021/22 were summarized and quantified. The procedures were analyzed in the various conditions that helped to define the phenomenon: the exclusion or marginality of access to the data connection, the health condition, the attribution of the condition of home isolation, the close contact with positive, the adequacy of teaching. Comparing the different types of teaching, due to the territorial distribution of the province of Trieste, the threshold of effectiveness of face-to-face teaching in learning is lower than that of integrated digital teaching: this means that in some contexts the threshold of effectiveness in learning is below an acceptable level. It would therefore seem that the way in which learning is measured, following the prolonged pandemic emergency, is no longer adequate to account for the recent phenomenon of Integrated Digital Education. The analysis of INVALSI data and the data collected by the prevention department together with the school figures who managed the positive data of the students and the COVID school representatives allows us to draw a picture of the potential and limits of the school in DAD/DDI mode. , in which it emerges that students have developed a greater capacity for autonomous learning and a greater ability to manage time. There is a decrease in school performance, especially in Italian and mathematics. Students developed greater autonomous learning skills and greater time management skills. While more research is needed to understand the full impact of distance learning on the learning and well-being of students in Friuli Venezia Giulia Region , on the other hand it is reassuring to note that many students and teachers have felt motivated to participate in online teaching and they felt confident in their ability to learn and to be challenging even in this new teaching methodology and activities. The efforts of individual schools, in particular in Friuli Venezia Giulia region, to exploit digital teaching tools have been a direct and important response to the pandemic but also the opportunity to incorporate digital technologies into educational practice. The data collected showed that the hybrid delivery was effective and allowed learning in the different contexts of school closure, suspension of face-to-face teaching for classes, groups of students or individual students. It is possible to conclude that from the comparison between indicators the criticalities emerge and the limits are highlighted in the face of the effectiveness on learning of integrated digital teaching. While more research is needed to understand the full impact of this modality on student learning, on the other it is reassuring to note that among the outcomes it is possible to identify greater motivation and confidence in one's ability to learn even in the new context.

Keywords: distance learning, COVID, representative prevention department

Some reflections on the Teacher Questionnaire

Paola Giangiacomo - Francesca Leggi

The year 2020 was marked by the emergence of the COVID-19. To overcome the limits imposed by the lockdown, a measure to prevent the spread of the virus, the world of schools has reacted with what can be defined as an educational challenge: distance learning. The school found itself experimenting with new

didactic, organizational, logistic and communication models in order to continue to guarantee the continuation of all the activities within its competence. In the European context, Italy was the first country to implement a national confinement system starting from March 2020. Schools and universities began to close at the end of February, starting in Northern Italy (Lombardia, Emilia-Romagna, Liguria, Piemonte, Veneto, and Friuli-Venezia Giulia). On March 10, the government extended blockade measures to all regions of the country. The interruption of lessons in the classroom therefore involved students close to the end of the current school year but the persistence of the circulation of the virus has severely marked, even in the following school year, the possibility of attending school classrooms continuously. Distance learning continued to prevail even in the school-year 2020/21. To mitigate the impact of school closures, countries around the world have rapidly invested in measures to facilitate distance learning, including solutions provided: online platforms, digital devices, and radio and television programs. Despite the undoubted efforts made to reach the entire student population, the concern remained that such a problematic and unforeseen event could have produced harmful effects in terms of learning and school dropout. The confirmation is present in the literature on the subject: a survey conducted by ISTAT has shown that 3 million children between 6 and 17 years may have encountered difficulties with distance learning during the blocking of lessons in presence due to lack of internet connectivity or devices at home and a survey conducted by Save the Children found that 28 per cent of children aged 14 to 18 know at least one classmate who has stopped attending school (remotely or in person) after lockdown. The same survey points to connectivity problems as the main reason for not attending remote lessons. The uncertainty about the non-repeatability of the phenomenon, or similar events, makes it necessary to have a series of tools to counteract the effects detected up to now. It is therefore essential to continue the research. This contribution intends to investigate the skills, methods, times, tools and resources that school principals and teachers have used to direct, coordinate, enhance the human resources of their institutes and to guarantee students the right to a continuous and quality learning, an indispensable prerogative for equitable and sustainable human growth. The introduction of distance learning has certainly placed teachers in front of obstacles, which approaches have been used to address the obstacles? What have been the effects of the pandemic on student learning? To find answers to these questions, the survey was conducted through the analysis of two databases. The first is the one containing the answers provided by school heads and teachers to the questionnaire administered by INVALSI to the school principals and teachers of the sample classes of the national tests, which, after 2020, investigated the changes related to the implementation of Digital Education. The second is that of the National Tests: the scores of the Surveys taken in the school-year 2020/21 were examined and compared with those obtained in the Surveys carried out in the school-year 2018/19, the two reference years were chosen for a timely comparison between the pre and post pandemic results. The first results revealed that teachers were able to use various information and communication technology (ICT) devices and take advantage of online learning platforms made available to support the implementation of distance learning. In almost all cases (92.8%) the teachers were already in possession of an adequate device, but if they were not, the lack of it was made up, in 82% of cases, by supplying computer devices in use in the school. Furthermore, they had the opportunity to participate in skills development projects (eg PON/FSE, MI projects, Erasmus, E-twinning, etc.) to experiment with innovative teaching methodologies. From the reading of the data it emerges that the teachers were able to adapt independently to the environmental conditions and to the characteristics of the students in carrying out distance learning. Therefore, in the face of a teaching staff that managed to "support" the crisis, from the first analyzes of the learning results of students between 2018/19 and 2020/21, important consequences are noted: compared to the pre-pandemic period, the decrease of learning is 9 percentage points. A decline that is more evident for minors with a migratory background, resident in southern Italy, or with difficult situations from an economic and social point of view. In general, there was a strong loss in learning in Italian, with differentiations between regions. Linear regression made it possible to evaluate the effect in quantitative terms of the variables under investigation, also taking into account the socioeconomic level of families.

Keywords: pandemic, school closure emergency, remote education, learning loss

Effects of COVID-19 on foreign students

Giovanna Filosa

The health emergency, and the consequent, hasty, and often improvised experimentation of distance learning (DAD), have exacerbated existing contradictions and criticalities in the Italian education system (Argentin et al., 2021). Consequently, the inequalities in digital learning have unleashed a “San Matteo effect” which has benefited those who already had the tools, cognitive and infrastructural, to face a type of teaching that is not always inclusive. On the contrary, pupils who were already leaving in situations of disadvantage or educational poverty, with particular regard to students with a migratory background, are often excluded from both traditional teaching and those alternatives to attendance. What prevents real school integration, regardless of presence or distance, is the lack of skills in the language of the host country, often experienced as a "fault", rather than as an objective difficulty to be overcome through appropriate teaching methods. These problems, together with the difficulties encountered both by teachers (Inapp 2020) and by families, have overshadowed, in public opinion, the potential advantages of integrated digital teaching (DDI), if it is complementary, and not an alternative, to face-to-face teaching (Deplano, 2020). Yet, during the pandemic and in the gradual return to still rather precarious normality, there have been promising examples of DDI, which have been able to decline truly inclusive teaching within an emergency context (Filosa & Parente, 2020). But the enhancement of these experiences, and their dissemination in the near future, cannot ignore a general rethinking and modernization of teaching, both from a methodological and infrastructural point of view, which makes it truly inclusive at a distance but also and above all in the presence. This rethinking must be accompanied by adequate processes of evaluation and measurement of results, with all the problems and criticalities that they entail. But measuring the results may not be enough to fill the gaps that the results themselves highlight. To support and enhance, especially those realities that successfully deal with problematic contexts and situations, it is necessary to integrate quantitative and qualitative evaluation devices (Martini, 2020), in a complex and non-punitive perspective. This contribution, part of a wide-ranging work in progress, aims to address these aspects from a theoretical and empirical point of view, focusing in particular on the potential and limits of the INVALSI data for the purpose of evaluating school situations that include students with a migratory background. These analyses are part of the current debate on the evaluation of inclusive schools, in the belief that, in the case of a strategic sector such as education, policies must be not only evidence-based but also ethically oriented. The hypothesis is that the current school structure only increases the gaps between the native component and the component with a migratory background of the student population, gaps sharpened by the pandemic but already present and growing even before COVID. The most recent INVALSI national aggregate data freely accessible via the platform will be used, with particular attention to the gaps of first and second-generation students compared to Italian ones. Data from INVALSI periodical reports will also be used, in order to reconstruct historical trends based on average scores achieved by Italian and foreign students, starting from the introduction of anti-cheating statistics. If available, the data from the INVALSI survey relating to the school-year 2021/22 will also be used. INVALSI data will be treated from a descriptive point of view, both by interrogating the Tableau tool, freely accessible from the Institute's portal, and by reconstructing historical series starting from previous reports. The average scores in the tests of Italian, Mathematics, English Listening, and English Reading, in all the school grades involved in these tests (II primary, V primary, III secondary of I degree, V secondary of II degree) will be compared. Data analysis up to the school-year 2020/21 confirms the strong gaps between Italian and foreign students. The deepest gaps are found between Italians and first-generation immigrants, especially in Italian tests and in the third grade of secondary school. Probably the gaps in language skills in the language of the host country have also had a negative impact on the learning of mathematics and, presumably, all other curricular subjects. So much so that these gaps are only attenuated in the English Listening and Reading tests, where second-generation immigrant pupils, always in the eighth grade, achieve results on average even higher than Italian students. INVALSI results of the school-year 2021/22 will also be examined, if available. Unfortunately, the absence of disaggregated data between schools that provide inclusive education and schools geared toward more competitive teaching does not allow quantitative comparison between the scores of the two groups of schools. Therefore, at present, we can affirm that INVALSI data are useful tools for measuring the gaps between students and between schools. But to understand which teaching methods and policies are best suited to bridge these gaps, further investigations are needed, not only quantitative but also qualitative. For example, many of the schools that practice inclusive teaching focus their teaching methodologies on

collaborative learning based on group problem-solving. Is such learning compatible with competitive and individual tests?

Keywords: DDI, migrants, assessment, TEL, learning

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