



# IX SEMINAR

"Data from and for educational systems:  
tool for research and teaching"



Andrea di Bonaiuto (Andrea Da Firenze), Allegory of Sciences, 1365-68

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Under the patronage of



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## INTRODUCTION

The Seminar "Data from and for educational systems: tools for research and teaching", now at its nine 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, Emiliano Campodifiori, Michele Cardone, Federica Colli, Ettore De Sossi, Alessandro Gaeta, Paola Giangiacomo, Patrizia Giannantoni, Pierangelo Grosso, Jana Kopečna, Fabrizio Lasorsa, Giuseppina Le Rose, Francesca Leggi, Lorenzo Maraviglia, Michele Marsili, Giancarlo Mastrone, Marcello Napoli, Fiammetta Noccioli, Carlo Palmiero, Monica Papini, Daniele Rowlett, Antonio Severoni, Massimo Smiraglio, Agnese Spoladore, Valeria F. Tortora.

The teaching sessions are organised by the research group of Area 3 – School Evaluation Area: Michela Freddano (Manager), Cristina Stringher, Patrizia Toma, Daniela Torti, Emanuela Vinci, Alessia Cividin, Miriam Mariani, Sara Pastore, Ilaria Salvadori.

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The opinions and contents expressed within the initiative are the exclusive responsibility of the speakers and are in no way attributable to the INVALSI.

# **SESSION 1. STUDENTS AND INVALSI STANDARDIZED TESTS**

**ORGANIZER: INVALSI**

**COORDINATOR: DANIELA TORTI**

**DISCUSSANT: MARTA DESIMONI**

**17 OCTOBER: 11 AM -1 PM { ROOM 2 – TEACHING 1 }**

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## **The effect of question context on INVALSI test results**

**Alessandra De Angelis - Maria Chirico**

Introduction. STEM subjects are often a stumbling block for students especially for school pathways that do not have math, physics and science as foundational subjects, and this aspect also becomes clear when comparing Invalsi results among different types of schools. Educational research in recent years (Michellini & Stefanel 2016; Laws 2004; Redish, Hammer 2009; Meredith, Redish 2013) agrees that an approach to STEM disciplines that is a blend of theory and practice, in which science and mathematics are conveyed through other disciplines in a multidisciplinary synergy, can be effective. The goal that should be set is what Lillian McDermott, speaking of physics, calls a functional understanding of physical concepts (McDermott, Shaffer 1992, McDermott et al 2006), but which may well be extended to mathematics as well. As noted by Zan, mathematical questions should be presented in a way that is more relevant to the student, and this can be achieved by making them closer to the student's reality or chosen subject areas that should reflect the student's passions and predispositions. In a previous survey, it was found that one of the main difficulties noted by students is that related to understanding the question, but understanding the question has two levels, a first level refers to language, and a second, less explicit level refers to the world that the question brings into play. There is no doubt that the first skill that is brought into play when faced with a mathematics question, after simple reading, is the understanding of terms and especially concepts. Several researches in the literature have investigated this aspect and observed how many students complain of an apparent "suspension of meaning" (Schoenfeld, 1991). Based on these observations, some studies have highlighted (Verschaffel et al.,2000) the important role of the lack of realism of the problems presented in the difficulty students experience in solving them. In a recent paper (Zan, 2007) an interpretation of this phenomenon is proposed based on the interaction between what Bruner calls "narrative" and "logical" modes of thinking. According to Zan, the situation that is described in the word problem-the "story"-requires the student to enter a context (in Cobb's sense) that is called narrative. Next, after the student has constructed a representation of the situation presented by the problem, he or she moves on to construct the resolution process, and it is at this stage that logical thinking plays a key role. The purpose of the present work is to assess what the effect may be in the student's problem-solving process of being faced with a real problem, but it is not simply a matter of proposing reality tasks but rather tasks of the student's reality; in fact as Kilpatrick (1987) points out the one who has to solve the problem (the student) is different from the one who proposes it (the teacher or textbook), in other words, the problems students work on in school are "proposed, and formulated, by another person" (Kilpatrick, 1987).

Research objectives and hypothesis. The objective of the analysis underlying this paper is to assess what influence on a correct solving process can be of the context that is introduced through science questions, particularly mathematics.

From the above analysis, the following questions result:

- Do students perform better in questions that involve their life context?
- Do students perform better in questions that are related to their field of study?

- Do students perform better in questions that feature more elementary language?

Data. In order to prepare the survey, the questions made available by GESTINV platform and the curricula provided in the second and fifth years in the various fields of study considered for the analysis were used. The questions were revised/modified so as to make them close to the social context (Cobb) of the student taking into account on the one hand the reality in which he/she lives and on the other hand the address of study he/she has chosen and which should reflect his/her interests and passions. It can be said that it was intended to turn the questions into a reality test, but of a reality that was meaningful to the students. The data that we want to elaborate concern the results coming from the submission of these questions to second and fifth grade classes in two different second-grade institutions, one in Southern Italy and the other in Northern Italy, both of which have a non-primarily scientific address.

Method or approach. The method used to conduct the analysis included the following actions:

- consider several INVALSI math questions related to grade 8 and grade 10;
- divide the different questions into the different domains and identify one question for each domain;
- construct two different tests, one (which we will call the basic test in the following) with the starting questions and one (which we will call the curved test) with the questions modified based on the social context of the students and based on the address of the school in which they were administered;
- analyze and compare the results obtained by different classes in the basic test and the curved test

Results or arguments. The thesis to be refuted with the present investigation is that a question presented as a reality task curved on the basis of the student's experience and direction of study is perceived as more stimulating by the student because it concerns the aspects that most engage him or her and furthermore, problem solving is perceived as a goal-oriented activity (Cobb, 1986) and not an end in itself.

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**Keywords:** Curvature, Skills, INVALSI, Address, STEM

**MEM - Motivate, care and improve skills**

## **Carla Sermasi - Palmiro Potentino Propato - Carmine Iannicelli**

The path is a proposal being designed by teachers and school managers, aimed at increasing awareness of the need for the importance of motivating and taking care of students.

The objective is to acquire greater awareness among teachers and students that the INVALSI national standardized tests seek to measure students ability to think with their own heads. To produce, rather than reproduce. The awareness that we intend to acquire is that the production of learning is carried out with motivation: we produce more and better with active experiences and having fun.

We therefore propose a training course aimed at achieving adequate skills for skills-based, motivating teaching for university students and newly hired teachers in approximately three schools in some regions in Italy.

How to successfully approach the study? What skills, knowledge and competences facilitate learning? Through what mechanisms do different study strategies and methods allow us to understand more deeply and remember more effectively? What role do reflection skills or the different styles with which the student approaches the different disciplines play? Can every student become a brilliant student? In trying to understand we have identified at least four distinct levels or components. The first level refers to innate abilities, the second to the strategies used to learn, the third to metacognitive abilities and finally the fourth to motivation. While these levels can also be studied and defined separately, their functioning must generally be seen as a whole, since there are close relationships between one component and the other and the boundaries between some levels, in some cases, appear to be particularly blurry.

The recipients of this training proposal can be newly appointed primary school, lower secondary school, upper secondary school teachers and/or university students currently attending the primary education sciences degree course.

The path can be shared in lifelong learning training even with teaching staff already in service in the educational institutions involved.

The training activities included in the course are designed, planned and implemented to achieve the strengthening of the teachers' skills in relation to the topics of Motivation and Learning, Empathy, Education on mind-body-meanings-contexts connections, in order to acquire the ability to design scholastic learning experiences, suited to the needs of living the playful, laboratory-based learning experience, with heuristic, rewarding research activities aimed at achieving results in relation to student learning.

The existing proposals are aimed at building a training path subsequently addressed to an action-research activity for teachers, which can be carried out with the guidance and supervision of university professors and with the support of workshops held by figures such as academic tutors of internship.

Training project MEM MOTIVATE, TAKE CARE AND IMPROVE.

Group members:

- Senior executives
- Tutors
- Teacher trainers

Recipients:

- Students of Primary Education Sciences and teachers of Primary/ Secondary schools in Italian regions (north/central, north/south areas)
- Newly hired temporary primary and secondary school teachers
- Newly hired permanent primary and secondary school teachers
- Primary Education Science students

Main thematic areas

The course aims to focus on thematic areas relating to:

- relational and transversal skills
- customization
- to take care of
- educational needs of all students
- initiatives aimed at motivating student learning
- integration into the curriculum

- motivation and motivating learning experiences
- construction of motivating semi-structured tests
- initial, ongoing and final learning evaluation paths

Definition of contents:

- Cognitive, strategic and metacognitive components of learning
- Motivational components of learning
- Intrinsic motivation
- Motivation for success
- Learning objectives
- Perception of ability
- Development of motivation to learn
- Motivation and its measurement
- Motivation styles
- Our being in the world
- The connections emotions and knowledge
- Knowledge and emotions
- Combining interiority and accuracy
- Bodily roots of empathy
- Well-made heads and well-made bodies
- Brain plasticity
- Restructuring of the training experience
- Care relationships
- The key notions of action research
- The methodology of action research
- Building motivating learning experiences
- From learning experiences to the construction of semi-structured tests.
- Semi-structured tests in Italian, Semi-structured tests in mathematics.

Training methodologies:

- Action Research Paths
- Jigsaw
- Shared construction of laboratory experiences
- Shared construction of heuristic search experiences
- Process approach and formalization into procedures

What the Trainer does:

- Construction of a laboratory training unit of approximately 25 hours MEM for teachers and/or university students
- Proposal of the MEM MOTIVATE AND IMPROVE training activity to some teachers in 1 north region (Trentino Alto Adige), in 1 north or central region (Emilia Romagna/Lazio), in 1 south region (Campania/Sicilia)
- Construction of a MEM MOTIVATE AND IMPROVE action research path with teachers from some schools identified in the 3 regions north/centre/south
- Construction of semi-structured Italian Subject MEM tests to MOTIVATE AND IMPROVE
- Construction of semi-structured Mathematic Subject tests MEM MOTIVATE AND IMPROVE

Times Spaces Tools and materials needed:

- April 2024/September 2024: Drafting of a training program by teachers and managers of n. 3 Italian regions
- October 2024/May 2025: Training proposal in some educational institutions through MEM training units and in some universities through MEM laboratories
- June 2025/March 2026: Comparison of the experiences carried out
- Analysis of Invalsi outcomes in the schools involved

Expected results:

- Increase teachers' experiences of caring for students
- Increase motivating laboratory activities

- Improve the results of students in the INVALSI national standardized tests, in the two school years following the implementation of the training units/training laboratories, in the teaching schools of the teachers involved in the training unit/laboratory MEM MOTIVATE, TAKE CARE AND IMPROVE.

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**Keywords:** Action research, Training, Self-training, Motivation, Skills, Fragility, Excellence, Implicit dispersion, Academic students, Newly hired teachers, Laboratories, Development pact, Improvement, Less effort, More interest

## **From the fifth class of the primary school to the third year of the secondary school and the two-year high school period to encourage conscious participation in the INVALSI tests**

**Valentina Mandruzzato - Francesco Mammarella - Lisia Piovano - Alice Rinzivillo**

Introduction. The proposal is part of the self-evaluation process, school year 2022/2025, of the Omnicomprehensive Institute of Città Sant'Angelo, in the province of Pescara, starting from the analysis of Invalsi data in the 2020/2021 school year of the fifth classes, now current third classes of the lower secondary school and the consequent choices in the 2022/2025 training offer plan. Over the course of three school years, including the current one, some goals and process objectives have been set to promote conscious participation and consequent sharing, involvement of students and families in a path of horizontal and vertical continuity. In this proposal we analyze what was carried out in collaboration between the fifth classes of the primary school and lower secondary school classes in the school year. 2023/2024 in order to avoid what has been identified as critical points for the current third classes of lower secondary school. Specifically, we intend to illustrate the actions implemented such as:

1. 2023/2024 bridge project for the first term of the first classes of lower secondary school with the presence of a specialized primary teacher to support, mentor in the PNRR Dispersion editions;



2. presence of an Italian teacher in primary and lower secondary schools (autonomy staff) for reading comprehension courses both within the curricular courses and within the school library;
3. use of the 2022/2023 Invalsi Tests to analyze student microdata and the training of the current first classes of lower secondary schools;
4. use of the Invalsi test items to understand the levels of learning both in teaching and assessment activities for the disciplines covered by the national tests.
5. use of the data emerging from the field of school psychology which resulted in the presence of a psychologist at school for psychological support for students, students' families, school staff, coaching for the school head, promotion of psychological well-being, prevention of distress psychology and scientific research. Through the school psychological service, teachers can report students' weaknesses or the students themselves request it; for primary school it is often families who request direct advice from the expert. Within lower secondary school, it is the teachers who report the emotional fragility of students and during upper secondary school it is often students who request psychological counseling in complete autonomy.

The process was enriched by meetings with families and with the involvement of high school teachers who operate in the two-year period of the five courses in order to understand which attitudes emerge in the transition from primary to lower secondary school and to high school. A further aspect implemented and monitored is that relating to conscious participation in the various activities to promote cooperation councils in the current fifth classes of Primary, councils of students who will be involved in the training of the first classes of the Secondary School of Città Sant'Angelo Marina and Centro Storico, with the involvement of students and families of the Comprehensive school which is present in the area and which flows into the lower secondary school of the Comprehensive. Students are listened to and involved in the perspective of Shared Leadership<sup>1</sup> (research path - two-year training with Indire 2022/2023 and 2023/2024). In this sense, we work to promote the resources/potential of each student and the responsibility resulting from shared choices.

The second classes of the two-year high school are instead involved, with critical and reflective approaches, also in the self-evaluation of their choices according to the new guidelines relating to orientation and the new certification of skills Ministerial Decree no. 14 of 30 January 2024<sup>2</sup>, compared with the certifications in the fifth primary and third secondary classes.

Research object and hypothesis. The object and research hypothesis concern the planning, implementation, verification and monitoring of initiatives aimed at teachers, students, families, also in relation to training needs related to knowledge, understanding and conscious participation in Invalsi tests. It relates to how and why to participate also to give meaning and meaning to the training activities functional to the development of the student's profile in the first cycle and in the transition phase from the two-year period of compulsory education to the three-year period of high school. In this sense, documentation, data study and in-depth analysis of educational and training issues related to school results, national tests and social and civic skills are promoted.

The accompaniment of the Indire Institute for Shared Leadership and student protagonism, together with the actions of the various PNRR projects, has made it possible to consider the opportunity to innovate teaching, in particular mathematics, Italian and English, to promote participation, interest of students, the educational success of each and every one through the promotion of cultural, social skills and personal responsibility. Conscious participation also in

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<sup>1</sup> <https://www.indire.it/progetto/leadership-condivisa-per-il-cambiamento/>

<sup>2</sup> [https://www.miur.gov.it/documents/20182/7975243/m\\_pi.AOOGABMI.Registro+Decreti%28R%29.0000014.30-01-2024.pdf/bb2aeae3-7803-bd2f-48a9-a8c174e19501?version=1.0&t=1707228861855](https://www.miur.gov.it/documents/20182/7975243/m_pi.AOOGABMI.Registro+Decreti%28R%29.0000014.30-01-2024.pdf/bb2aeae3-7803-bd2f-48a9-a8c174e19501?version=1.0&t=1707228861855)

dealing with the Invalsi tests according to the framework of the 2012 National Indications: it is necessary to ensure that students and families receive timely and transparent information on the criteria and results of the assessments carried out at different moments of the school career, constantly promoting their participation and educational co-responsibility, in the distinction of roles and functions (families, school, Invalsi).

The object of the research involved the identification of a group of teachers from primary school, lower secondary school and the second year of high school, with the contact person for relational education<sup>3</sup>, with the management staff, who operated through the perspective of the "research teacher", to provide support both for the other teachers and for the families and the parents committee.

In this process, tools and materials consistent with the above have been arranged, relating to both the national tests and the tools put in place in previous and current school years for remote comparison and sharing, under careful supervision of the projects carried out as from priorities, goals and process objectives selected in the self-evaluation report.

Method. The chosen method is that of critical and constructive thinking which starts from participation and how one experiences a school which defines itself as participatory, which welcomes students and families to contribute to understanding together why we are involved in teaching the Invalsi tests, the culture of evaluation, to define and collaboratively plan a concrete improvement proposal for the school and for our children/students. In the cooperation councils, in the meetings with families and with the older students of our Omnicomprehensive Institute, we discuss what possible actions to carry out in the short, medium and long term. It is involved to make all the protagonists understand the evaluation of school results, of the tests taken, of the key citizenship skills in the belief that a parent, a student, a teacher who is not aware of it is part of the problem and not the solution.

Participatory and transformative research paths allow us to:

1. analyze the strengths and weaknesses of the school experience, facilitating factors and obstacle factors;
2. research, plan, discuss to propose improvement actions;
3. promote democratic education (education through democracy)<sup>4</sup>

In this way, motivation and learning are based on being active and involved, on a sense of belonging and on well-being.

Results. For children currently in the fifth classes of the primary school, for students currently in the first year of lower secondary school, for students currently in the second year of high school, a significant increase in participation is expected during the three-year period 2022/2025 which promotes the culture of evaluation with the awareness that comes from perceiving that teachers encourage students to

- make decisions about class and laboratory activities;
- make decisions about the topics they learn about in class;
- make decisions about how they are evaluated;
- express opinions on the school and on how the different components participate in defining the rules.

Different levels of reflection are imagined for teachers in future, among all, this work focuses on the motivations and on how to choose a problem highlighted by the data and perceived as relating to the comparison between groups of students for the prevention of dropout, given the strong commitment planning of the PNRR, the PONs and significant experiences relating to the promotion of social and civic skills.

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<sup>3</sup> <https://www.miur.gov.it/-/direttiva-n-83-del-24-novembre-2023>

<sup>4</sup> <https://www.principlesofdemocracy.org/education-dem>

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**Keywords:** Involvement, Membership, Relationships with teachers and peers, Educational climate, Evaluation

## Conscious participation: INVALSI tests and engagement strategies

Luigi Umberto Rossetti - Lucia Scotto Di Clemente

Introduction. This study explores the strategies adopted by some educational institutions to promote informed participation of students and their families, through an analysis of current practice, strategies and different approaches to involve and sensitize students on the importance and objectives of INVALSI tests. Through an analysis of current practices, different approaches have been identified to sensitize students and families on the importance and purpose of these tests, with the aim of encouraging an informed and active involvement of the same. The intent was to describe and trace the good practices activated by educational institutions aimed at promoting an educational culture based on the empowerment of students and the active participation of families in the educational process.

Reference literature. There are several national and international studies that address the topic of research on the understanding and participation of students and families in standardized tests, such as Invalsi tests. Internationally we find the work done by Sui-Chu Ho and William Lowe Boyd published in "Family Involvement in Children's Education: Successful Local Approaches" (2002), which explores the role of parental participation in the education of their children and its impact on academic achievement. "The Impact of Parental Involvement on Children's Education" by Epic Learning Centre, on the other hand, summarises several studies and research on the impact of parental participation on the education of their children, including academic achievements, While, the OECD has published several reports and documents on parental participation in the education of their children ("Parental Involvement in Education"). Among the Italian authors who dealt with the topic we find Pier Giuseppe Rossi professor of methodology of social research at the University of Trento, who has published several research on educational evaluation and the involvement of students and families in the Italian school context and Luciano Anolli, professor of general psychology at the University of Milan-Bicocca, who studied the perception and interpretation of standardized tests among Italian students. Among international authors, Larry Cuban, a professor at Stanford University, has authored several books and articles on education, including studies on the history of educational assessment and the impact of standardized testing on schools and communities. Helen Ladd, professor of public policy at Duke University, has published numerous studies on educational equity, including work on parental participation in schools and evaluation policies. James Popham, scholar of educational evaluation is the author of several books on the design and implementation of standardized tests and tests. Karen Mapp, a professor at the Harvard Graduate School of Education, is an expert in the field of parental and community involvement in education, with a focus on family participation in school decisions and evaluation.

Object and hypothesis of research. The main objective of the research was to obtain a strategic information base on the choices made by schools to promote an informed participation of students and their families.

Research question:

Q1. The initial research question was identified in an attempt to understand the existence of a planning and a strategy to involve students and families in the Invalsi activity;

Q2. Modalities of communication and involvement of stakeholders;

Q3. Analysis and comparison of educational institutions.

With reference to Q1 it is evident that not all Educational Institutions deal with the same way and with the same importance the question of the participatory and informed promotion of their students and their families. Therefore, a first distinction is between educational institutions that implement or do not implement a planning of involvement of students and families in the Invalsi activity.

In Q2, having established the existence of educational institutions carrying out an organized planning activity, the aim was to verify whether and how they carried out communication activities and stakeholder involvement.

Finally, in Q3, the question arose of the possibility of comparing the data obtained from descriptive research.

The research course was targeted by some schools in the Campania region with voluntary membership. Research methodology. The research methodology used was action research. It is a methodology that combines the investigative aspect of research with practical action to address real problems in specific contexts. Descriptive research is a type of research that focuses on the description of existing phenomena, events or situations, without trying to explain or modify them. In this case, descriptive research has been identified and used to understand the current knowledge of pupils and families about the Invalsi tests and their purposes, as well as to identify any gaps or misunderstandings.

The main idea on which the research was structured was structured in the following steps:

1. Problem identification: the area to be investigated has been defined. In this case the lack of knowledge or understanding of INVALSI tests by pupils and their families;
2. Data collection: questionnaires have been prepared and sent to the participating schools to collect information on the current knowledge of pupils and families about Invalsi tests and their purposes;
3. Data analysis: analysis of collected data to identify factors that affect the perception of invalsi evidence;
4. Development and implementation of strategies: Using the results of the descriptive phase, examples of good practice and/or targeted strategies have been developed to promote a better understanding of the tests Applied among pupils and their families. At the end of the school year, information activities such as information workshop, specific teaching material, meetings with parents or other.

The aim of the research was to identify concrete actions aimed at improving the understanding and conscious participation of pupils and families in the Invalsi tests, thus helping to promote a better School/Invalsi system.

Tools. The questionnaire is the tool used within the search method used (descriptive search) to collect data and information from participants. The structure of the questionnaire was finalized to gather information on the knowledge of the Invalsi tests and their purpose and involvement of the pupils and their families.

1. Introduction:

- Brief presentation of the reason for the questionnaire and its purposes;
- Assure respondents that their responses will be treated anonymously and confidentially.

2. Demographic information:

- Age of the pupil;
- School grade;
- Level of parental education.

3. Knowledge of INVALSI tests:

- Familiarity with INVALSI tests (for example, have you ever heard of INVALSI tests?);

- Knowledge of the subjects involved in the INVALSI tests;
  - Understanding the purpose of INVALSI tests.
4. Participation in INVALSI tests:
- Participation in INVALSI tests in previous years;
  - Any concerns or questions regarding participation in INVALSI tests.
5. Perception and impact of INVALSI tests:
- Perception of the usefulness of INVALSI tests for one's own learning;
  - Perception of the impact of INVALSI tests on the teaching/learning process in schools;
  - Any opinions about the positive and negative aspects of INVALSI tests.
6. Involvement of stakeholders:
- General presentation Invalsi
  - Communications prior to INVALSI exercises/tests;
  - Presentation of results Invalsi
7. Opinions and suggestions:
- Opinions and suggestions for improving the INVALSI testing process;
  - Any other comments or comments.
8. Conclusion:
- Thanksgiving for participating in the questionnaire;
  - Please contact your school for further information or questions.

Much attention was given to the creation of the questionnaire in particular to the clarity and neutrality of the questions avoiding ambiguity or too complex technical language that could confuse the respondents. A combination of open-ended questions (to allow respondents to freely express their opinions) and closed-ended questions (with predefined answer options) was envisaged.

Results.

The results obtained at the end of the trial were:

- Current level of knowledge: degree of familiarity of pupils and their families with the INVALSI tests and their purposes, understanding of the subjects involved in the tests, the organization, communication and the importance of the tests for the school career;
- Gaps in understanding: elements in limited knowledge or misunderstandings about INVALSI tests both in the practical aspects of the tests (question format) and the purposes of the tests;
- Opinions and perceptions: information on the opinions and perceptions of pupils and their families regarding the INVALSI tests, their assessment of the usefulness of the tests and the concerns or criticisms regarding the tests themselves;
- Feedback on proposed strategies: information on the positive and negative aspects of the strategies implemented by schools, as well as suggestions for possible improvements or other actions to be taken.

Future perspectives. The research intervention has been included among the evaluations of strategic choices in order to urge schools to plan and choose effective strategies for greater and more conscious participation of students and their families in the system Invalsi.

It could be assessed over time whether the awareness-raising activity has contributed to a greater conscious participation of pupils and their families in the INVALSI tests through the identification of specific benchmarks such as an increase in participation in the tests themselves.

The future goal is to expand research to other educational institutions differentiating them by order of school, type of Institute at the national level. It is also hoped that research can be validated and made universal so that it can be applied in all schools

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**Keywords:** Information, Organization, Testing, Communication, Questionnaire, INVALSI, Control

## **The cultural choices of the digital generation (Formal education vs informal education?)**

**Sebastiana Fisicaro**

Introduction. The cultural consumption of adolescents has an effect on scholastic outcomes, school is not the only educational experience. What kind of "skill" is it in knowing how to quickly find different types of information on the Internet when you need it? The use that adolescents make of the internet describes "digital skills" but the potential for their social and cultural life remains unequal. In recent decades, interest in the cultural consumption of adolescents and the impact on school learning has grown greatly. The present research examines the relationship between the cultural consumption of a macro sample of adolescents and their SNV outcomes. The literature has highlighted relevant dynamics, Smith and Jones (2020) reveal a positive correlation between involvement in cultural activities and academic performance, greater motivation and commitment to study. Brown et al. (2020) highlighted the importance of reading, those who dedicate more time to reading obtain higher scores in language and literature. Garcia and Martinez (2020) showed that students, regularly using online resources, have greater digital competence and broader cultural knowledge with better academic results. Habitual use of the Internet affects 90% of adolescents, 9 out of 10 use search engines of which 60% to download materials and only a few to open a site, blog or other. The most frequent activity is listening to music or exchanging files, but not at school both due to the connection and the skills of the teachers. The digital generation, the finger or thumb generation, uses social media to fill a horror vacui and fill every space/time by messaging or playing.

Object, objectives and research hypotheses. The object of this research is to investigate cultural consumption in a macro sample of adolescents aged between 15 and 18 and answer the following questions: Does adolescent consumption provide teachers with elements to reduce implicit dispersion? Can young people's cultural choices in informal and formal contexts improve literacy (reading and mathematics)? Are the difficulties that students demonstrate due to the study method or to the lack of "direction", no wind is favorable for the sailor who does not know where to go. Comparing the correlation between reading, mathematics and personal interests, analyzing time management, skills, the ability to understand, infer and argue in literacy could bring the school closer to the student, actively participating in improvement and conveying informal and formal learning.

Data used. The data obtained from the questionnaire on cultural choices, literacy and from the focus group arguments in a macro sample of 99 adolescents, divided into three sub-samples by age and levels: fragility, at risk of fragility, no fragility. Each of the three sub-samples responds to the same questions in the questionnaire, the responses of each sub-sample are reported below. First sub sample (15 and 16 years old). How many hours do you dedicate to listening to music every day? From 30' to 5 hours. How many hours do you dedicate to reading every day? From 30' up to 4 hours and 50% one/two hours. Do you prefer to read online? One said they didn't read much and 70% read physical books. 90% watch films in streaming. 71.4% have participated in events in the last 6 months, 78.6% listen to music online. Can technology influence cultural consumption and cultural choices? 46.2% say YES, 15.4% say NO. No answers to What would you like to change or improve in your cultural consumption? 78.6% use online resources Wikipedia and YouTube. Three out of 15 teenagers participate in events. 92.3% are supported

by their family in their cultural interests, 85.7% share their interests with friends. How much time do you spend studying mathematics every day? The answers from 2 hours a week to 1 hour a day. The most used strategy is YouTube. 42.9% have an interest in mathematics, 50% do not use online resources for learning. Is there anything you would like to change or improve in the current education system to better support your interests? 30% the study method and personalized paths, 16.7% nothing, considering formal education distant from cultural interests. 100% use online resources for their studies. 80% find the use of devices useful and 20% consider it useless at school. The results of the standardized tests of the first sub-sample show that 60% are not at risk of frailty. Second sub sample (17 and 18 years old). How many hours do you dedicate to music every day? From 30' to 5 hours. How many hours do you dedicate to reading every day? From 30 minutes to 4 hours, everyone reads physical books. The hours dedicated to watching films is from 2 to every evening in streaming. 50% have not participated in cultural events in the last 6 months. Digital content affects 55.6%. Can technology influence cultural consumption and your choices? 22.2% declare YES, 22.2% declare NO, the others Partially. No answers to What would you like to change or improve in your cultural consumption? 70% use TikTok, Spotify, Instagram and YouTube and nobody participates in events. 80% are supported by family and 60% have friends with whom they share interests. How much time do you spend studying mathematics every day? About 20' and strategies include tutorials on YouTube or taking notes. 1% are interested in mathematics, 89% have never participated in competitions, 66.7% do not use online resources. Is there anything you would like to change or improve in the current education system to better support your interests? Yes, I would like to change the school timetable, the teachers' methods and the school curriculum. 66.7% use online resources. The results of the standardized tests of the second sub-sample show that 90% are fragile or at risk of fragility in Italian and mathematics. Third under sample (16 years), 66.7% girls and 33.3% boys. How many hours do you dedicate to music? From 1 hour up to 7 hours online. How many hours do you dedicate to reading every day? 50% say they don't read. 90% watch movies in streaming and 2% watch TV. 86.7% participated in cultural events in the last 6 months. 66.7% access digital content. Can technology influence cultural consumption and choices? 46.7% say YES, 20% NO, the others Partially. There is no answer for What would you like to change or improve in your cultural consumption? 66.7% use Wikipedia, forums, scuola.net and YouTube. 30% participate in activities. 86.7% are supported by their family in their cultural interests and 80% have friends with whom they share interests. How much time do you spend studying mathematics every day? From 1 hour to 2 hours, strategies include: exercises, notes and explanations from the teacher. 33.3% participate in competitions or competitions and 33.3% use online resources. Is there anything you would like to change or improve in the current education system to better support your interests? Yes, the teacher-student approach to cultivate passions and increase motivation. 50% use online resources, 50% books. The results of the standardized tests of the third sub-sample show that 60% show no weakness in Italian, while the weakness is in mathematics.

Method or approach. The investigation is qualitative/quantitative with statistical, documentary and comparative analyses of the data collected. The administration of the questionnaire, with multiple and open answers, took place individually and on a voluntary basis, involving 99 adolescents between 15 and 18 years old, 30% boys and 70% girls. Among the data collection tools there are the questionnaire, the 2022 INVALSI results and the focus groups. The surveys develop metacognition between cultural consumption, learning and evaluation (SNV outcomes). The analysis focuses on: fragility, at risk of fragility, no fragility (Italian and mathematics). Other data come from a survey on perception (Weick, 1997) and the relationship between cognition, emotion and school outcomes (James, 1980) in children with high percentages of dropout risk.

Results or argument. Analyzing the perception of adolescents limits the gap between the real world and the school world. The comparison of useful data on formal and informal education classifies the value scale of adolescents in the field of education. Adolescents live in an increasingly technological environment, which forces them to adapt quickly to learn new knowledge. "We live immersed in an enormous flow of information which, to be subjectively governed, requires knowledge and skills that can only be acquired in a process that lasts for the life". Social media offer children countless

opportunities to test their relational skills and attitudes and constitute a privileged space for experimenting with new connections and bonds (Marino 2020). However, the comparison of the data collected highlights a disconnect and a waste of resources in the fight against dropout by schools.

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**Keywords:** Cultural consumption, Established outcomes, Learning environments



## **SESSION 2. THE USE OF INVALSI DATA FOR SCHOOL SELF-EVALUATION AND IMPROVEMENT**

**ORGANIZER: INVALSI**

**COORDINATOR: MICHELA FREDDANO**

**DISCUSSANT: BARBARA BARBIERI**

**17 OCTOBER: 11 AM -1 PM {ROOM 3 – TEACHING 2}**

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### **Let's train to improve: an Institute self-training experience to reflect on teaching practices starting from INVALSI data**

**Marianna Rasetta - Stefania Buonarrota - Katia Forlizzi**

Introduction. The self-assessment group of the Istituto Comprensivo of Loreto Aprutino, in Pescara's Province, in "Rav" 2022/2025, observed a strong discrepancy between school results (self-assessment 5) and results in standardised tests (self-assessment 3). Over the last two school years, to overcome this gap, the Institute has been carrying out an improvement action, in collaboration with the Headmistress and her staff, and included in the three-year "PTOF", linked to the development and enhancement of human resources through the training of internal teaching staff.

The path started under the title 'MAT-ITA SUPER' involved two concrete and closely activities: know to improve and train to improve.

These activities were shared, in part, during the 8th Invalsi seminar "Data for research" in the contribution called: "The results of the Invalsi tests as a tool for strategic planning" in which it was illustrated how our Institute has implemented the knowledge, study and interpretation of the results returned by Invalsi with an analysis both at institute level and at level of individual class councils involving all the teachers. In particular, every year, the teams that each year will be involved in the Italian, mathematical and English tests in grades 2, 5 and 8 draw up a report on the possible causes of poor results in the national standardised tests, after an in-depth analysis of tables and graphs returned by INVALSI.

Research objective. The paper objective is to illustrate the second phase of the activity undertaken in the school year 2023/2024: "Let's train to improve". The aim of this action is to improve teaching-learning processes through reflection and sharing of good practices.

Three training modules of 20 hours each were thus designed, involving three internal teachers, appointed by the Headteacher, to coordinate three working groups, one for each subject covered by the INVALSI surveys: Italian, mathematics and English.

The courses activated involved 63 primary and secondary school teachers distributed among the three working groups according to the subject or teaching areas.

Method. Each training module was divided into 4 phases. Phase 1: shared viewing of the training videos chosen on Invalsi Open with discussion and reflection within the working groups on the issues addressed Phase 2: planning of classroom experimentation activities with structured and unstructured materials also in small groups. Phase 3: experimentation of the activity in one's own classes and documentation of the experience. Phase 4: return and sharing the experience.

The first two phases and the related feedbacks were conducted in presence for a total of 9 hours; the experimentation and documentation phase (11 hours) was recognised as a project work activity. The materials and documentation produced were shared via the classroom virtual learning platform.

In the Italian working group, the path proposed focused on the macro aspect of reconstructing the text on a local and global level; specifically, a study and reflection activity was launched on the pupils' difficulties to identify implicit inferences in the text, to search the activities to strengthen and develop the ability to deduce information from phrases or words in the text.

The group, made up of Italian teachers, shared in the first part two videos on text comprehension available on the Invalsi Open website, paying attention to the analysis of how the theme of inferences is

dealt with in the INVALSI tests and to some didactic proposals to be experimented in class. The teachers then collectively shared the reflections arising from the viewing of the training video: the discussion, stimulated by the items analysed in the video, was oriented in the direction of focusing on the criticalities in the lexical and semantic inferential processes encountered in their students in order to build, on the criticality detected, activities aimed at recovering these processes for an effective understanding of the text. Subsequently, by school order and by parallel classes, the experimental activity dedicated to strengthening the ability to grasp inferences in a text was designed. The experimentation of micro-pathways, on the implicit in the text, was carried out in all primary and secondary school classes; at the conclusion of the activities there was a restitution during which the self-training group shared and reflected on the outcomes of the teaching proposals for the various classes. In the mathematics working group, the representation of numbers was chosen as content area. After watching the in-presence training videos, the learning goals and objectives relating to the focus defined were identified in order to become aware of the close link between the national standardised tests and the National Curriculum Indications. Subsequently, the teachers involved researched the Invalsi items related to the representation of the number in the various school grades and years using the Gestinv 3.0 platform; finally, they created a test with ten items to propose in class after having made, *ex ante*, an estimation of possible answers. Reflections and debates arose on the teaching-learning difficulties encountered in everyday teaching on the highlighted conceptual nodes and, subsequently, concrete teaching activities were planned as well as micro paths of reflection and argumentation with the pupils, starting precisely from the difficulties encountered in the proposed items. Within the working group, in the restitution phase, a possible vertical curricular path was outlined from the first primary to the third secondary school on the topic.

In the English working group, the focus was on reflecting on and studying the difficulties pupils encounter in listening activities. After sharing the primary and secondary school development goals and the related language output competences, we moved on to the analysis of training videos on the Invalsi Open platform with the main focus on reading skills, the construction of authentic texts and the use of activities aimed at promoting integrated skills. For reading, the teachers shared teachable strategies, emphasising that working on them gradually improves pupils' understanding of texts. In particular, the reading strategies used were: skimming, reading a text quickly in order to grasp the essence; scanning, reading a text quickly in order to find specific information; contextual guessing, making assumptions about the meaning of unknown words thanks to the linguistic and graphic context in which they are inserted; cloze exercise, completing the blank spaces in a text, where some words have been omitted; predicting, formulating hypotheses about the content of a text, based on paratextual elements such as images, titles, subtitles and using one's own pre-knowledge. The teachers, in small sub-groups, carried out warm-up activities, expanding the vocabulary, trying to pay more attention to pre-listening and listening activities with interactive comprehension and listening proposals by constructing and carrying out tests consistent with the topics and subjects tackled in the various years. In particular, this activity, of constructing tests and sharing materials, was very useful and stimulating as there are currently no standardised tests for classes below grade 5 in Italy.

Results. At the end of the courses all the teachers were given a questionnaire on the self-training experience by means of a google form. The teachers expressed a positive opinion, considering the self-training experience interesting and very formative for 70% of the teachers and quite formative for the remaining 30% also about the topics covered. Furthermore, the work steps were clear and feasible and well timed. Most of the teachers managed to carry out the experimentation activity in the classroom, 60% of the teachers worked in groups and 23% alone; some teachers defined the planning part together and carried out the experimentation part alone. The involvement of the pupils, the self-produced material and the tools used represent the strengths of the experimentation phase, while the implementation time, which was too short and concentrated on a short period, represents a weakness of this phase. Overall, the teachers stated that participation in the self-training enabled them to: become aware of the learning processes to be activated and of the strengths and weaknesses of the class and of each individual pupil; reflect on their own way of working and deepen their knowledge of the Invalsi

tests; and design, in a shared way, meaningful training paths to try to implement a concrete, reflected upon, experienced and acted upon vertical curriculum.

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**Keywords:** Self-training, Teaching practices, Experimentation

## A Self-Training Experience on the Usage of INVALSI Items in Teaching Practice

Graziella Marrone - Marianna Rasetta

Introduction. This paper describes the self-training and research-action experience done in the 2023-2024 school year by Loreto Aprutino Comprehensive Institute's teachers in mathematics field. In November 2023 started the self-training course named "Let's Train to Improve" with the purpose to implement the second activity of school's Improvement Plan, called "MAT-ITA SUPER". The first activity entitled "Knowing to Improve" was carried out in the school year 2022-2023. It has the purpose to share and analyze the students' results related to the national standardized tests of the classes with the primary and lower secondary school teachers, focus on the areas and dimensions highlighted as critical. This action, raised from the contribution of the VIII Seminar "DATA FOR RESEARCH", involved in a first phase the INVALSI deputies of the Institute to support the interested classes councils in the analysis of graphs and tables available in the INVALSI Cineca area.

The self-training of the Institute "Let's Train to Improve" is an opportunity for teachers to understand how better plan a possible vertical curriculum related to a subject: mathematics, and a topic: the area of numbers, starting from the analysis of the items used in the INVALSI booklets to structure a test from a formative perspective.

The foundation of each training or self-training is take time to think on own teaching and assessment practices. Since the dawn of time, the teacher has been considered a "reflective professional" (D. Schon, *The Reflective Practitioner*) who reflects on the experience done to define more and more aware and effective action models. Reflecting on educational and didactic practice promotes the ability to give meaning to one's actions, to give value to everyday behaviors, attributing clear meanings to them.

Objectives. The 20-hour mathematics self-training course took place in: 3 face-to-face meetings of 3 hours each, 11 hours of experimentation in own's class and finally documentation of the experience, during the November-December 2023. The objectives were: to reflect in a shared way on the conceptual nodes of mathematics from a vertical perspective to design and test the training units in classroom; to share teaching practices to improve them.

Data. The mathematics working group chose as topic the numerical representation, paying attention to the dimensions of knowledge, debate and problem solution for two main reasons: firstly, the INVALSI results of the school year 2022/2023 of the second and fifth primary school, showed a percentage of

correct answers below the Italian score; secondly, because, in the period in which the experimentation was started, most of classes were facing to the content area related to numbers.

Working method. In the first self-training meeting, the mathematics teachers of the primary and lower secondary school had: watched together the dedicated webinars proposed in the training area, on the INVALSI open platform handled by Professor Giorgio Bolondi; shared the conceptual nodes raised; looked for references related to the objectives and learning outcomes within the National Guidelines 2012, consistent with the chosen planning path.

In the second meeting, the teachers were organized, by the coordinator teacher, into 3 vertical groups to select the focus of the study of the chosen area, starting from the INVALSI tests of the previous years and in the reading guide. Each group created a structured test using the GESTINV and INVALSI Cineca platforms. The selection of the items was carried out by searching the questions that concerned the representation of numbers as factorization, positional value, representation on the number's line, fraction, decimal number or power of ten, between the grades 2, 5, and 8. Each working group analyzed each item identified preparing the planning grid, proposed by the first INVALSI researcher, Professor Stefania Pozio during the second edition of the training "I dati Invalsi per un uso informativo, formativo e per il miglioramento" (June 2023). The grid was used during the test planning phase, in order to clarify the learning objectives to be verified and the related expectations, according to the activities already carried out in the classroom. The teachers thought about the abilities of the students in their classes to solve the identified items, making an estimation of the possible correct answers given and hypothesizing the reasons why of wrong or not given answers.

The experimentation phase in classroom took place with given time test consisting of 10 items. Afterwards, all the questions proposed were analyzed, discussed, and argued with the students, both to promote metacognitive experiences and to confirm or not the hypotheses previously made by the teacher. Subsequently, didactic reinforcement activities were designed and implemented on the conceptual nodes that were found as gap.

In the third face-to-face meeting, dedicated to the feedbacks on the experimentation carried out, the micro paths realized for each school years were illustrated, starting from the structured test phase to the reinforcement proposals on conceptual nodes that were found to be difficult for students, in a longitudinal path from the first primary to the third lower secondary grade school.

The teacher's reflection on his/her own teaching-learning methodology and the didactic practices implemented were the central and shared aspects within the mathematics department.

Results and expectations. This self-training path allowed each teacher to deepen the knowledge of tools such as: the INVALSI Reference Frameworks, the tests and materials available on the platforms used such as GESTINV, INVALSIopen and INVALSI Cineca. Each teacher acquired a greater familiarity with the usage of shared planning tools and the development of structured tests on the chosen topic, thinking on the teaching-learning processes implemented. It is expected that each teacher will be able to replicate these planning parts in order to work with greater awareness also in other mathematics areas to improve the results in standardized tests.

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Esempi di domande di matematica per il grado 8, available at INVALSI Cineca, Area riservata and website Gestinv 3.0.

**Keywords:** INVALSI tests, Number representation, Main topics, Teaching practices, Vertical path

## External evaluation manages the school self-evaluation

Alice Severi - Marilena Anna Maddaluna

Introduction. The Self-Assessment Report (SAR) is a strategic document of the school, established by DPR No. 80/2013 and modified with the entry into force of Law 107/2015, aimed at identifying a strategic line through a careful analysis of the indicators of the school institution to identify measurable objectives on learning and processes, including inclusion (Damiani et al., 2016).

Defining priorities in the SAR is therefore a consequence of a study on the outcomes and didactic and managerial processes of the school community as a whole; this in-depth analysis is carried out by a committee, discussed in the departmental meetings, reported to the teaching staff, from the perspective of shared leadership (Poliandri, 2016).

The Improvement Plan (IP) is a document containing actions aimed at achieving the goals connected to the priorities indicated by the SAR. "This process should not be considered statically, but in dynamic terms as it is based on the involvement of the entire school community" (MIUR Note No. 7904 of 01/09/2015). The IP is included in the Educational Offer and School Programming (POF) (as required by art.1 c.14 of Law 107/2015).

The results, monitored through the indicators on the goals of the SAR, are disseminated and shared within the school during faculty and department meetings, and are also made public on the school's website and on "Scuola in Chiaro" (a platform for transparency in Italian schools) (Godfrey, 2020).

DPR 80/2013 introduced Social Reporting as the final phase of intervention on the education system; this documentation plays a fundamental role in the connection between one triennium and the next of the SAR, because it serves to communicate whether the priorities set have been developed in an active process of improvement, which has also led to higher levels in student outcomes.

Object and Research Hypothesis

The educational research presented is based on the study of the results of national standardized tests, fundamental for the self-assessment of the institute as they are defined as priorities in the SAR 2022-25 (Cacciamani, 2016)

The research hypothesis aims to show that comparing outcomes by all members of the school community allows for the establishment of shared priority processes, adopted by the majority of school staff.

Data Used. In this research work, data returned by INVALSI over the last 4 school years are used, in the second and fifth grades of the secondary school II ISIS Follonica.

The data are analyzed together with the educational, didactic, managerial, and organizational practices adopted in the previous three-year period of Self-Assessment.

ISIS Follonica includes eight different courses of study: scientific high school, scientific high school with applied sciences option, high school for humanities, language high school, technical-economic institute with tourism, administration, finance, and marketing, and business information systems, professional institute for health and social assistance services.

The analysis of the data allows for a differentiated report in the courses of study compared to the same type of school, but guarantees a heterogeneity of strategic vision that constitutes a strength in collaboration for the achievement of objectives.

At ISIS Follonica, the SAR 2019-22 prioritized the Development of European Key Competences: Functional literacy, Mathematical competence, personal, social competence, and ability to learn to learn. Method. Starting from the analysis of data returned by INVALSI, this work compares changes in student learning outcomes with the reference school years of the SAR.

By correlating the results in national standardized tests with the strategies implemented in the ongoing SAR and with the consequences of the previous triennial document, the progress of the institute is analyzed.

First, the class councils involved in the tests, then the departmental meetings, have held meetings where they analyzed the INVALSI results and defined the level and indicators to work on. The data were shared among the coordinators of the various departments, and the differences between classes and between courses of study within the same institute were also analyzed.

The method of comparing data in standardized tests and in achieved competences allows for an in-depth analysis of the current situation of ISIS in its relationship with the adopted tools and design.

The proposed activities for student improvement range from Paths for Transversal Skills and Orientation, to interdisciplinary curricular learning units, not only in the subject of civic education. Furthermore, the school participated in national competitions and proposed courses to prepare for such competitions to enhance excellence and improve motivation. Training courses chosen and organized for teachers aim to improve skills in educational innovation, digital skills, and collaboration and sharing of pathways.

Results. From the analysis of the SAR indicators and INVALSI results, it can be noted that some strategies used have a positive short-term impact and in the disciplines subject to standardized tests; as for other activities adopted, it is hoped that they will lead to a positive result in the indicators of the coming years, also thanks to revisions and new actions implemented by the school and all its stakeholders.

The path undertaken by the Institute seeks to integrate technological tools with innovative methodologies. The choice to enhance teacher training on digital and the PNRR (National Recovery and Resilience Plan) paths "School 4.0 Plan" Action 1 - Next-generation classroom and Action 2 - Next-generation labs (D.M. 161/2022), "Actions for the prevention and contrast of early school leaving" (DM No. 170/2022), and "STEM and multilingual skills in state schools" (D.M. 65/2023), allow for actions based on the direct needs of the school, because they are based on in-depth data analysis and monitored by specific SAR indicators.

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**Keywords:** Self-assessment, Reporting, Improvement, Innovation, Methodologies

## RAV and INVALSI data: tools for reflection in the school community

Maria Carbone

Presidential Decree 80 of 2013 introduces the National Assessment System. With Law 107 of 2015, the Italian school system embarks on a virtuous continuous cycle of evaluation, improvement and reporting. The first phase of the three-year period, is the self-evaluation process, through which the school, coming

out of its self-referentiality, is called upon to carefully and punctually analyse all the data made available to it, from different sources, MIM, Invalsi, Istat. A conscious self-assessment activates a virtuous cycle of continuous improvement, because it is the necessary condition for identifying the priorities on which to work for the three-year period of reference and, at the end, for reporting on what has been achieved, the results obtained and any deviation from what was hypothesised. The national evaluation system provides a platform in which reports accompany educational institutions in the process from self-evaluation to social reporting. Social reporting closes the previous three-year period and a new three-year period starts with the school questionnaire and the RAV update. The RAV is an excellent tool that helps the school in the process of self-evaluation in fact, the logic behind the RAV is descriptive evaluative and proactive. Between RAV and INVALSI there is a close correlation in fact, in one section of the outcomes you can find the results obtained by the school in standardised tests. The work presented is aimed at sharing the experience implemented in my school on the use of standardised test results. The NIV and the DS favour and support the direct involvement of the entire school community, favouring meetings to share the objectives and operating methods of the entire self-evaluation process; it enhances internal resources; it encourages the reflection of the entire school community through a redesigning of the actions by resorting to new approaches, also by making use of operational proposals linked to previous experiences in this field. The RAV compiled, by the NIV and the school headmaster, is widely illustrated in the teachers' board where strategies and planning are also shared, considered suitable for achieving the goals and outlined in the PDM. The Invalsi returns a wealth of data and each school institution can use them in the way it deems most appropriate by identifying strengths and weaknesses and thus activate its own improvement actions. The data returned are comparable over time, as they are anchored, and this makes it possible to define the goals to be achieved in percentage terms, in fact it is more appropriate to use values expressed in percentages rather than just the generic word 'improve'. Excellently compiled data and documents would be meaningless if they do not become the object of reflection in the school community, which must activate effective actions aimed at ensuring that all students achieve satisfactory levels of learning and at reducing the educational gap of students with unsatisfactory levels of learning. Below I share the actions aimed at different target groups and the timing implemented in my school following the return of test data. At the second teachers' meeting, a report is shared that compares the distribution percentages in the learning levels in the certificate of competence compiled by the school with the levels returned by INVALSI at the end of the first-cycle final examination. A presentation with groupings of data returned by INVALSI is projected at the following teachers' board meeting.

The data are also automatically reported in the RAV in the area "Results in national standardised tests" and are very detailed and varied. The INVALSI contact person with specific competences and trained on the SOFIA platform, disseminates in the NIV and the improvement group the way the INVALSI data are interpreted, the structure and meaning of the RAV. The meetings of the NIV at the beginning of the three-year implementation period of the PTOF are fundamental in that critical issues, priorities and goals to be achieved through the definition and implementation of the PDM are identified. Some teachers who are part of the NIV and other teachers, including some instrumental functions, make up the improvement group. The priorities identified in the school where I teach relate to the sections: results in standardised tests and key competences. The RAV contains indicators, the same for all schools, in order to avoid self-referral. The NIV reflects and identifies constraints and opportunities offered by the context and stakeholders, as well as the outcomes achieved and processes implemented by the school, to express strengths and weaknesses based on data and evidence. Through the territorial references, the school can compare its data with those at provincial, regional, macro-area and national level depending on the type of descriptor. In each area of Outcomes and Processes there are the relevant evaluation rubrics, through which the NIV expresses a judgement, starting from the quality criterion, using a scale of possible situations from 1 to 7. Situations 1 (Very Critical), 3 (Somewhat Critical), 5 (Positive) and 7 (Excellent) are described through anchors (examples) that serve to understand which level of the scale the school situation is closest to. Situations 2, 4 and 6 are not described, thus allowing the school autonomy in attribution. Following the reflective process, the NIV identifies the priorities,

through a SWOT matrix, the related targets and process objectives. The board of teachers approves what is proposed. In the results section in standardised tests, starting from the detailed data returned by INVALSI, the school where I teach has identified three priorities with the related targets expressed in percentage terms to which the process objectives have been linked.

The INVALSI contact person works with the DS to sistraton, the passwords to access the results of their classes. This allows for personal reflection on the results. One departmental meeting is reserved for reflection on the school's results in the disciplines surveyed and for sharing training and teaching experiences learned in specific training courses. In the course of disciplinary meetings, a number of questions submitted are examined in order to discuss the attribution of the level of difficulty, search for the link with the National Guidelines and the processes that must be activated to answer them correctly. Most of the teachers consider the use of the Jestinv platform in all classes to be a valuable support. Internal communication channels are used to disseminate links to webinars organised by INVALSI, articles of particular interest published in the InvalsiOpen magazine, ways of accessing the test archive and the Tao platform.

A good number of teachers are aware that all these tools are useful to become familiar with the format of the tests and discuss them in class. It is agreed that in order to improve results there is no need for training with the different tests, but there is a need for more laboratory-based teaching linked to real contexts to stimulate students to think about what they are studying and to make it their own. The DS provides the teachers of the primary V classes with access to the students' results from the tests they took in primary V. This is important both for the organisation of the school, which can devote specific support/reinforcement actions to classes with low learning levels, and for the class teachers, who can appropriately calibrate their teaching action. The involvement of parents is also decisive. During the meeting to elect class representatives from among the parents in Class 3, a specific time is set aside to illustrate to parents the meaning and value of standardised tests. It is specified that the individual skills certification issued by INVALSI does not replace the teachers' assessment and is not a second report card, it flanks the assessment made by the teachers and constitutes a legitimisation of the tests themselves.

It is emphasised that although not linked to the final assessment, it is a stimulating way for pupils to confront themselves with common types of tests throughout Italy. Parents are asked to cooperate so that the tests are carried out in the right balance without anxiety but not with superficiality. In addition, the correlation between knowledge, skills and competences is clarified. Before the tests, together with the administration schedule, a link to the parents' guide provided by INVALSI open is published on the school website. The class teachers explain the functions of the Tao platform to the class and provide the link to some of the tests for practice. The results obtained in these tests are sent to the teachers and in class they reflect on the results and discuss the procedures implemented to provide the answer. The DS sends the school board chairman the passwords to access the data return and shares with the board the reflections on the data and the improvement actions to fill the critical points identified in the results section of the Rav such as class formation criteria, project activities.

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**Keywords:** RAV, INVALSI data, reflection, School community

## **INVALSI Data for Implementing PNRR 1.4: An Operational Model to Address Disparities and Dropout Rates, ITI "Archimede" of Catania**

**Giorgio Cavadi - Fortunata Daniela Vetri - Ornella Campo - Tiziana Tornabene**

**Introduction:** This contribution illustrates the research, innovation, and experimentation path undertaken by ITI "Archimede" of Catania during the implementation, monitoring, and reporting phases of activities financed and prescribed by D.M. 170/2022, Definition of criteria for the allocation of resources for actions to prevent and combat school dropout as part of investment line 1.4. "Extraordinary intervention aimed at reducing territorial disparities in the first and second cycle of secondary education and combating school dropout" within Mission 4 - Component 1 - of the National Recovery and Resilience Plan, financed by the European Union - Next Generation EU.

It aims to demonstrate how Invalsi data has been used as a decisive and complementary element to the school's own data in the analysis and identification phase of students at risk of dropping out, who had sporadic attendance or were on the brink of entering the risk zone, or were already in a situation of implicit dropout.

The work was initiated in collaboration with the PNRR 1.4 Support Group of the Sicilian Regional School Office (USR Sicilia), with whom operational indications were shared and informative/training seminars were organized for schools receiving funds to disseminate best practices during the project implementation phase.

The intervention's scope and the tools built by the team for combating dropout were defined in coherence with:

- the purposes and criteria for identifying target students as described by DM 170/2022 and PNRR 1.4 Disparity Reduction;
- the theoretical/practical intervention framework described by the Guidelines "Combatting educational failure and disparities", funding 1.4, measure 4 PNRR, Document of the ministerial working group;
- data on implicit dropout and general learning levels of Sicilian students, deduced also from the INVALSI Reports 2022 and 2023;
- the operational instruments and methods described in the "Operational Instructions for Actions to Prevent and Combat School Dropout";
- TERRITORIAL DISPARITY REDUCTION AND COMBATING SCHOOL DROPOUT, Guidelines for implementing interventions in schools, Mission 4 - Component 1 - Investment 1.4: Extraordinary intervention aimed at reducing territorial disparities in the first and second cycle of secondary education (D.M. 170/2022);
- the document, "Guide to Reading the .cvs file on student fragility condition," INVALSI 2022.

**Subject, Objectives, and Research Hypotheses:** The research aims primarily to describe the operational model implemented by ITI "Archimede" of Catania, the recipient school of PNRR 1.4 action "Disparity

Reduction", which has implemented a series of specific interventions aimed at achieving assigned targets and milestones.

Data Used: The team primarily used:

- files containing data on fragile students returned by Invalsi 2022, updated through comparison with INVALSI 2023 test results;
- data derived from survey sheets drawn up by the design team, including student self-assessment;
- co-design sheets for basic skills interventions;
- survey sheets and synthesis between INVALSI data, scrutiny outcomes, and student self-assessment;
- data obtained at the end of the intervention for comparison between scrutiny outcomes, INVALSI 2024 and 2025 test results, and student self-assessment.

Method of approach: A first step involved initiating a path of improvement through an experimental approach starting from the analysis of Invalsi data. This path involved both internal school personnel and third-sector entities, aiming to build an integrated educational system capable of producing stable effects in the future and, above all, favouring the improvement of learning levels through personalized interventions.

A second step involved the verification of the correlation between the participation of fragile students in the three paths provided by the macro-actions of mentoring, basic skills enhancement, and participation in laboratories, and the respective improvements in learning levels possibly achieved in the next Invalsi report. A particular focus will be given to measuring the added value produced by collaboration with external experts in basic skills.

Results and outcome: Comparative analysis of the Invalsi Report of July 2024 will assess the learning outcomes of students in the involved classes to determine how participation or non-participation in PNRR initiatives may have influenced improvements in learning levels, reduction in sporadic attendance and dropouts, and disparity reduction. This comparison will also be made by comparing INVALSI 2022/23 outcomes with 1st trimester + final scrutiny outcomes of the previous and current years.

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**Keywords:** Improvement, Disparity reduction, Personalization, INVALSI data analysis, Academic results

# SESSION 3. EUROPEAN KEY COMPETENCIES AND LEARNING TO LEARN 1

ORGANIZER: INVALSI

COORDINATOR: HUGO ARMANDO BRITO RIVERA

DISCUSSANT: CRISTINA STRINGHER

17 OCTOBER: 11 AM -1 PM {ROOM 4 – TEACHING 3}

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## European practices and a framework of the key competence "Learning to Learn" for VET teachers and trainers: first results of an Erasmus + K2 project

Paola Ottolini - Andrea Giacomantonio - Caterina Aime' - Francesco Majorana

Introduction. CEDEFOP in its December 2022 briefing note *Looking to the Past to Understand the Future: What are the Possible Developments of VET system in Europe?*, asks how the content and supply of VET responds to the changing needs of countries, the labour market and society. Along with rethinking training standards and curricula, a strong emphasis is placed on the need to overcome barriers between initial and continuing education to create lifelong learning pathways for the development of soft and vocational skills. The note concludes that "How this happens will determine the relevance and overall quality of VET in the coming decades" (CEDEFOP, 2022:5).

The Erasmus + K2 project presented here, which began in October 2023 and is still ongoing, aims to respond to this challenge by proposing the development of a competence widely recognized as fundamental for supporting lifelong learning: learning to learn.

The theoretical framework chosen for the development of the project on this competence is represented, on one side, by the text of the European Council Recommendation of May 22, 2018 on key competences for lifelong learning, referring precisely to the competence "Personal, social and learning to learn" and, on the other side, by LIFECOMP (2020).

The operational project partners are 2 Vocational Training Centers (BIC - Slovenia and SPOK - Germany), 2 associations representing a network of vocational training centers (SCF - Italy and ANFA - France) and a research and continuing education institute (ISRE - Italy). There is also an associated corporate partner: IVECO – Italy.

The partnership was created because all entities agreed that the "learning to learn" competence should be considered strategic for the educational success of students and for their social and occupational inclusion. After all, Italian and international literature from the 1980s to the present supports this claim (Hautamaki, 2002; Pellerey, 2006; Marcuccio 2009; Stringher, 2021).

In the face of this need, however, it has been found that trainers are in great difficulty in understanding the development of this competence and, above all, in putting into practice training actions that support it in VET courses (Giovannini, Santanicchia, 2023). This is why the main target audience in the project is precisely trainers. The underlying hypothesis is that it is first and foremost necessary to take care of their professional development, their ability to learning to learn, for continuous updating of skills in adult life and to strengthen their resilience in the delicate educational role they play with students, but also to learn how to constantly improve their professional skills from the failure of an educational intervention (Winnie, Hadwin, 1998; Marcuccio, 2016).

Consequently, the development of the "learning to learn" competence of trainers was conceived within a eutagogical model of lifelong learning. In this model, "the learner is not only an actor in his or her own learning but represents an agent capable of helping to transform his or her context of action through a mature freedom/possibility of choice and self-governance [...]; the eutagogic model was first defined by Hase and Kenyon (2000) as a form of self-determined learning." Whereas in pedagogy learning is controlled by the teacher, in andragogy it is self-directed and guided by the trainer, in eutagogy learning is characterized as self-determined and self-adaptive" (Costa, 2023, 80).

Objectives. The main objective, therefore, is to define a training course, based on a shared framework among the European partners, for the development of the Learning to Learn competence for trainers in VET system; the common model will be validated through a pilot training course, at the national and transnational level, with trainers working in specific professional sectors (automotive and food). The specific objectives are as follows:

- definition of a framework for the "learning to learn" competence for VET trainers, with particular reference to the automotive and food sectors;
- development, testing (with 60 teachers) and evaluation of a blended training course organized into training units with related learning outcomes and learning materials;
- development, testing (with 60 students) and evaluation of a repertoire of teaching practices for different target groups of students.

Method and approach. The approach we adopt is the rationalist EU approach, which is embodied in competence-based teaching and is consequently culturecentric (Baldacci, 2008).

The project is divided into three phases:

1. development of a common framework of the "learning to learn" competence for VET trainers - from October 2023 to April 2024. The main results of this phase are to be sought first and foremost in the development of a shared language and a common understanding of the "learning to learn" competence for VET trainers. At this stage, a cognitive and interpretative basis is developed that is indispensable for the achievement of the project's objectives. The framework developed from LIFECOMP will provide a specific interpretative key not only for general VET system but also for two specific vocational sectors, automotive and food. The practice of learning to learn, in fact, like any competence, is domain, context sensitive. The framework will be composed of performance indicators and descriptors to support the development of training and assessment activities.
2. development, implementation and validation of a training course for the growth of the "learning to learn" competence for trainers - from May 2024 to July 2025. The specific objectives of this phase are: the definition and validation of a training program, including learning outcomes, related to the "learning to learn" competence for VET trainers and the development of related teaching/didactic materials (texts, exercises, real tasks, etc.). This training proposal will be constructed following the eutagogical approach above and, once tested, will form the basis for evaluating both the learning outcomes and the developed framework. The creation of a database of all documents and outputs related to the training in an open-source platform, allows it to be always available and accessible to trainers participating in the project but also to all those who would like to use them.
3. development and testing of some teaching practices with students. This phase will lead to the development of a Directory of teaching activities for the development of the "learning to learn" competence in the automotive and food sectors. As a function of reading data regarding students' "learning to learn" competence, trainers will also be stimulated to use Learning Analytics (LA) with the main objective of providing them and the students themselves with detailed learning information. This may include data such as student performance, learning patterns, behaviours, and study habits online or in the classroom. Activities carried out with students are intended here as a means of supporting trainers in reflection as part of their training. This phase will contribute to the overall goal of increasing the capacity of VET trainers and teachers to reflect on their professional practice "to elaborate horizons of meaning" (Schön, 1993).

Results. The results we will present in this contribution are:

- a Report of analysis of practices and experiences on the development of the competence "learning to learn" specifically for VET teachers and trainers in the four partner countries (Italy, France, Germany, Slovenia)
- the shared framework on the "learning to learn" competence for VET trainers, with indicators and descriptors, starting from the one already formulated in LIFECOMP, with particular reference to the automotive and food sectors

The analysis report may certainly be useful in understanding what is being done in other European countries regarding the development of Learning to learn competence in VET trainer training; the

framework, considering that it will be shared among VET practitioners from as many as 4 European countries, may be an excellent starting point for reflection on trainer training and for the construction of professional development pathways. A further development perspective may be to test the validity of the framework for teachers coming from other backgrounds or working with other age groups, from a developmental perspective.

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**Keywords:** Learning to learn, Training trainers, VET system, Lifecomp, Framework, European practices

## Learning to Learn: The Contribution of the *Writing and Reading Workshop*

Alessio Trevisan - Silvia Pognante

Introduction. Learning to learn is defined in literature as a "meta-skill"; it is indeed a real mental habit that each person must be able to build to succeed in learning independently, functionally, and responsibly. Many elements contribute to the construction of learning to learn: they range from the physical dimension to the emotional and cognitive ones. Among these, a fundamental aspect is text comprehension. The contribution aims to investigate how the laboratory approach of the Writing and Reading Workshop, through experimentation and learning reading strategies and thinking routines, can significantly contribute to text comprehension as a fundamental dimension for learning to learn. The

first part of the intervention will present the learning setting used and the pillars of the Writing and Reading Workshop, the second will describe a specific educational intervention: a reading laboratory on non-fiction texts. The choice of non-fiction is not random: students are immersed daily in non-fiction texts, as most of the textual materials used for learning school subjects are expository or expository-argumentative texts. Non-fiction texts, moreover, will be those with which they will interact most in daily life and work experiences. In this perspective, text comprehension, a component of learning to learn, is a crucial aspect of key competences for life.

Object, objectives, research hypothesis. The object of the research is text comprehension as a key dimension of learning to learn in the methodological and pedagogical context of the Writing and Reading Workshop. The research objectives are:

- observe and describe the thought processes of students in text comprehension;
- demonstrate that a laboratory teaching approach, designed taking into account first of all the key competences, has positive effects on text comprehension and learning to learn;
- verify the transversality of reading strategies and thinking routines experimented in the Writing and Reading Workshop laboratories on the expository text. The research hypothesis is: the methodology of the Writing and Reading Workshop significantly supports learning to learn, especially regarding deep text comprehension.

Data used. Two comprehension tests of a non-fiction text, administered to a first-year secondary school class, allowed for the collection of data relating to the ability to locate and identify information within the text;

- reconstruct the text's meaning, at a local or global level;
- reflect on the content or form of the text, at a local or global level, and evaluate them.

A historical topic text constitutes the first test; a scientific topic text constitutes the second test. This is also to determine the transversality of the applied interventions.

The first-year secondary school class consists of 20 students from the Comprehensive Institute Settimo I in the city of Settimo Torinese, in the northeast outskirts of Turin.

The first test was administered before the reading and writing workshop on the expository text, the second at the conclusion of the reading and writing workshop. Therefore, these are data derived from the questions formulated for the tests.

Accompanying the numerical data are systematic observations, student annotations, and self-assessments. In the perspective of learning to learn and the Writing and Reading Workshop, these elements are indispensable, although not quantitative.

Method or approach. The teaching approach used is that of the Writing and Reading Workshop, which asks the teacher to transform into a master craftsman and to think of the class as a continuous laboratory. Students operate in the classroom following the teacher's model and then experimenting on their own. The teacher shows how to do it and conducts personal consultations.

The analysis of the data is conducted through a comparison between the two tests, focusing especially on how the application of specific reading strategies or thinking routines have contributed significantly to the improvement of text comprehension competence. It is, therefore, a quantitative approach, supported also by qualitative evidence derived from the annotations of the boys and girls as well as from their self-assessments.

Results or argumentation. The improvement of the results in the text comprehension tests and the reading of the self-assessments highlight three fundamental aspects:

1. the experimentation and reiteration of reading strategies and thinking routines make access to the written text more gradual and effective for its comprehension;
2. self-assessment and reflection on learning is a crucial aspect for learning to learn;
3. the laboratory dimension, which allows a proper balance between teacher's indications, collective moments, and autonomous practice, contributes significantly to the development of text comprehension skills, therefore also to learning to learn.

From the numerical data and qualitative evidence, the importance of looking at learning to learn with a holistic approach emerges, training and enhancing the different dimensions that compose it. The laboratory approach of the Writing and Reading Workshop not only acts on the dimension of reading and understanding but also on that of writing: the practice of writing, guided and accompanied by specific techniques and strategies, allows both to better understand the cognitive and structural

substrate of non-fiction texts and to work on aspects that contribute to the development of learning to learn (for example, fine motor skills, ideation, planning).

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**Keywords:** Learning to Learn, L2L, Reading literacy, WRW

## Standardized tests as a strategy for learning to learn

Ileana Ogliari - Andrea Guarnacci - Mariarosaria Orefice

Introduction. The school is increasingly taking on a fundamental role as an educational institution, not only in terms of the transmission of knowledge and content, but also as a privileged place for reflection on and towards the acquisition of competencies that are defined as lifelong, that is, those that serve throughout one's life. This approach to lifelong learning influences teaching, as it places it in a broader vision and has as its objective the construction of the person in all the components that characterize it, from the emotional to the orientational to the disciplinary. Among all, learning to learn is the key component on which to focus attention precisely to provide students with the tools useful to navigate the intricacies of life and knowledge, always with an outlook projected towards what can become part of one's personal and professional heritage. How can standardized tests be included in this broad and complex discourse?

Object and research hypothesis. The research starts from the observation of a school in a peripheral area within which the reading and interpretation of the data returned by INVALSI have always constituted one of the strategic levers put in place to ensure a progressive improvement in the learning levels of the students. The fundamental prerequisite for this purpose is to bring the students "inside" the standardized tests, inducing them to a reflection aimed not so much and not only at teaching to the test, but at a reasoned analysis of the proposed texts and the related items before identifying, for each one, the correct answer. In other words, the aim is to provide the students with a magnifying glass on their own mental processes to be activated in the face of structured questions in order to stimulate the competence of inferring the right answer. The intention is not only to acquire a method aimed at an effective and productive study in itself; rather, reference is made to the attitude with which one faces learning as a complex system of knowledge and skills that are put into play and merged until they become the key to being able to face the challenges of life with greater courage and awareness. At the same time, this type of work has aimed to make teachers increasingly protagonists in the search for efficient and productive strategies. Attempts, experiments, comparisons have allowed to recalibrate the objective from time to time so as not to lose sight of the goal, even though the learning paths may differ in form but not in substance. More specifically, in the current school year, the focus has been on working

with students organized into small groups and by level bands, which has proven to be really interesting from various aspects.

Data used. The data have shown over time a not always constant and not always satisfactory trend. We have mainly focused on the outcomes of grade 8, focusing in particular on the areas that have proved to be the most "vulnerable" over time. In this sense, the analysis of the descriptors of the competence levels provided by INVALSI has proved useful: the distribution of the students in each of them in the last four years has provided an internal indicator with which to map strengths and criticalities of the disciplinary programs of Italian, Mathematics and English. This has enabled the creation of exercises, as part of curricular planning, to be assigned throughout the school year. The focus of these exercises is not necessarily on the entire national test, but rather on specific questions whose solutions can help address the difficulties that have been identified over time. The use of the GestInv platform, which is instrumental in identifying a series of examples of functional items for each area, has proved fundamental. The hours dedicated to this type of work have also proved important in improving the focus of the students as well as preparing them without the anxiety of the unknown for the national grade 8 test. This strategy, also implemented in the first and second grades, also represents a coherent response to the objectives set out in the strategic school documents (RAV, PdM and PTOF) in which there is a constant reference to the need to achieve progressively better results on national tests.

Method. The analysis of the outcomes led the humanities and logical-mathematical departments to propose the following structured activity: divide the students of each class into four level bands (recovery, consolidation, enhancement, advanced), carry out activities with open classes for two hours a week, working with an adequate number of students who, in this way, felt more involved in the analysis of the tests. The figure of the teacher, as a guide and supervisor of the activity, assumes the role of an observer who has the possibility to focus not so much on the answers given by the students, but on their ability to ask the right questions to reach a shared solution. The attention to the reasoning process has, in fact, constituted the critical core of the system set up by the teachers and has allowed to detect attitudes and mental operations carried out by the students regardless of the test results. Results that have, in turn, improved precisely because of the type of work with which the items have been tackled. The change of perspective, which materialized in carrying out the task not to obtain a grade but to gain a method, has shown that the students perceived themselves as a small research group that gathered around a table, read, proposed hypotheses, reasoned, agreed together on the answers to give to the different items. This has also allowed to debunk many doubts about the actual usefulness of tests built to recover, consolidate, enhance competencies without disregarding, of course, knowledge. The main focus of the teachers has been on the choice of items to be submitted to the students among the available materials based on the most frequently encountered criticalities in the analysis of the results of the standardized tests.

Results. The results were optimal both in terms of student participation and in terms of method. The approach to the items not enforced by the teacher as something that "must" be done but moved by the assumption of "let's see how we can find a solution" has constituted a different motivation to face the tests and above all has provided a new strategy that fits well into the construction of such an important competence as learning to learn. Dedicating time, reasoning, reflection to each item has allowed to understand its structure more consciously, to identify the request with greater attention, to isolate the distractors, to focus on the truly necessary information, to experience the satisfaction of reaching a goal by clearly defining the path that has been deemed more appropriate. With this modality, even the error has proved to be an indispensable element to make choices and start from the assumption that everything is useful, as long as one is well disposed towards what can be learned. Learning to learn, what is it if not realizing the incredible potential that each one, in their own specificity, has? One of the many tasks of the school is to discover it and bring it out.

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**Keywords:** Items, Analysis, Reflection, Strategies, Competencies, Lifelong learning

## **The development of key competences: a strategy for supporting individualization processes**

**Andrea Giacomantonio - Fabrizio Giovannini - Marta Santanicchia**

Background. Between 2018 and 2023, the Italian National Institute for Public Policy Analysis (INAPP) conducted a research in pursuit of two main aims. The first aim was to devise a dispositive for the authentic assessment of *personal, social and learning to learn competence* along with three other key competences (citizenship competence; entrepreneurship competence; competence in cultural awareness and expression), to be implemented with secondary school students on Vocational Education and Training (VET) programs. The second aim was to develop *guidelines* and other support resources for the full integration of these four key competences into VET curricula, preparing them for the adoption of the assessment dispositive with its specific underlying values, methodology and structure. In this paper, we outline some of the new assessment dispositive's core features and the main stages in its development and testing.

Key competences have been viewed as underpinning lasting internal dispositions (Bourdieu, 2015), which – from a Deweyan transactional perspective – manifest themselves in individual action together with technical-professional competences and basic symbolic abilities. Structurally speaking, the key competences are theorized to comprise four distinct components, which are respectively intellectual, strategic, methodological and social and value-informed in nature (Giovannini, Santanicchia, 2023).

Given that assessment should be authentic (Wiggins, 1993), the assessment dispositive discussed here was primarily based on *real-world tasks*. VET trainers were provided with exemplary cases of real-world tasks and guidelines, enabling them to appropriately adapt the real-world tasks to the specific context (technical professional area of the course; basic competences to be developed, etc.). Concurrently, observation rubrics were developed (Castoldi, 2018; Tenam-Zemach, Flynn, 2015) that operationalized the dimensions of each competence, in terms of their main contents and indicators – some of which were common to all four key competences and some of which were specific to individual competences.

With a view to triangulating the data, the real-world tasks were administered alongside a battery of structured assessment tools, whose composition was modified during the study. The final set comprised: a reading comprehension test, the *Learning Strategies Questionnaire* (Pellerey, 1996), a revised version of the citizenship questionnaire developed in 2016 for the IEA ICCS survey (Schulz et al., 2018a, 2018b), a problem-solving test and a student questionnaire.

Introduction. It is plausible that a student's chances of success may be enhanced by the deployment of individualization, personalization (Baldacci, 2005; CERI-OECD, 2008) and differentiation (d'Alonzo, 2016) strategies. Recent meta-analyses by Hattie (2023) lend weight to this hypothesis. Indeed, mastery learning, which is one of the best-known individualization devices, has a mean effect size of 0.67 (Hattie, 2023, 316-317). Cooperative learning, which can also be interpreted as an educational strategy that fosters individualization, has an average effect size of 0.53. This effect is even stronger when cooperative learning strategies are compared to competitive learning or individualistic learning: the effect sizes increase to 0.58 and 0.62, respectively (Hattie, 2023, 384-385).

It is therefore plausible that also the development of key competences may be facilitated by seeking to individualize, personalize and differentiate student learning processes.

One of the key tools in the present newly developed dispositive for assessing key competences is the *Learning Strategies Questionnaire* (QSA) (Pellerey, 1996). This instrument has been studied extensively at the theoretical, empirical and didactic levels (Margottini, 2017; Ottone, 2014; Pellerey, 2006; Pellerey et al., 2013 and 2018). It may be of particular value in accessing the strategic dimension of key competences (Giovannini, Santanicchia, 2023). We therefore began exploring the potential of the new key competence assessment dispositive to inform individualization processes by analyzing the data collected with this tool.

Interestingly, Enrica Ottone has proposed that the QSA scales might be classified according to their theoretical potential to inform "specific", that is to say individualized, interventions (Ottone, 2014, 58). In this study, we set out to empirically examine this hypothesis.

Research aims. The aim of the research was to examine whether the QSA – a tool theorized to tap into the strategic dimension of the four key competences evaluated by the assessment dispositive – might be used to inform the individualization, personalization and differentiation of educational and training processes.

Data used. The research devoted to developing the key competence assessment dispositive was conducted over six phases. At each phase, a battery of instruments was administered to convenience samples of variable sizes and characteristics. For example, the first phase (November-December 2018) saw the participation of approximately 245 students from 13 classes at eight vocational schools in Northern and Central Italy, while the participants in the third phase – conducted immediately prior to the onset of the Covid-19 public health emergency – were 1,396 students from 65 classes at 42 vocational schools distributed across the entire country. The analyses presented here concern the data collected from this second sample of VET students.

Method. In light of our research aims, we first analyzed the data collected to establish whether it was possible to classify the students into homogeneous groups.

To this end, we subjected the data to cluster analysis, an exploratory and inductive technique (Lucchini, 2007). We followed a procedure that integrates the hierarchical method of cluster analysis with a partitional method (Barbaranelli, 2003). First, we used the former to determine the number of groups to be examined. Next, taking the centroids of the groups identified via the hierarchical method as the initial seeds, we performed the repeated partitions technique to optimize the distribution of the students across these groups. At the hierarchical step of the analysis, which was applied to cardinal and quasi-cardinal variables, we estimated the distances between units in terms of squared Euclidean distance and used Ward's method to group the units. At the partitional step, we drew on the K-means method which uses Euclidean distance as a measure of the distance between units. This approach minimizes the trace of  $W$  – in other words, it offers the solution in which the clusters display minimum internal variability and maximum between-group variability. The stability of the solutions obtained via the hierarchical and partitional methods was assessed based on the Cohen Kappa concordance index (Barbaranelli, D'Olimpo, 2007).

Results. After conducting preliminary analyses to verify the internal consistency of the QSA scales and to avoid collinearity effects, we performed the cluster analysis.

The cluster analysis identified four groups with the following main characteristics. The first group was made up of students who likely had special educational needs, given that they obtained unsatisfactory scores on almost all the QSA scales. The second group comprised students who appeared to be predisposed to achieve well at school. Their outcomes were the inverse of those obtained by the first group, with satisfactory scores on almost all the QSA scales. The third group was composed of students

who obtained low scores on the affective scales, especially the two scales relating to volition. The members of the last group, in contrast, displayed the lowest performance on the cognitive scales. Undoubtedly, the present analysis needs further refinement. Nevertheless, these preliminary data – although they mainly concern the strategic dimension of personal, social and learning to learn competence and the other key competences evaluated by the new assessment dispositive – appear to support our working hypothesis, namely that fostering processes of individualization, personalization and differentiation can also facilitate the development of the key competences themselves.

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**Keywords:** Key competences, VET, Assessment dispositive, Individualization, Cluster analysis

# **SESSION 4. THE USE OF INVALSI DATA AND MATERIALS IN TEACHING – ITALIAN**

**ORGANIZER: INVALSI**

**COORDINATOR: ALESSIA MATTEI**

**DISCUSSANT: ANTONELLA MASTROGIOVANNI**

**18 OCTOBER: 11 AM - 13 PM {ROOM 2 – TEACHING 4}**

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## **Laboratory of Language Skills-reflections and experiences from a methodological perspective**

**Claudia Califano**

Introduction. The debate on the issue of National Learning Surveys, commonly known as "InValsi Tests", is still open today and is the subject of attention both nationally and internationally. In the written evaluations carried out during the school year, critical issues emerged due to the lack of certain skills and competences, almost always more than in the pragmatic-textual dimension, in the lexical and grammatical one. Starting from the definition of functional illiteracy as a condition in which an individual has the ability to read, write and communicate in a basic way, but encounters considerable difficulties in understanding and analyzing complex speeches or texts designed for an ordinary person, the concept, over the years, has been extended to the difficulties of approaching the activities that characterize contemporary society, such as reading and comprehension of the media, computer proficiency, foreign language. A functionally illiterate person is more inclined to believe everything he reads uncritically, failing to understand, evaluate, use and get involved with written texts to actively intervene in society, to achieve his goals and to develop his knowledge and potential. Therefore, functional illiteracy can have significant impacts on people's social participation, employment, and general well-being. In Calabria, the situation regarding functional illiteracy is particularly significant and the region holds the Italian record with 15.2% of functional illiteracy for women and 10.9% for men. In fact, some investment lines of the PNRR are aimed at bridging territorial gaps that include interventions on language skills, learning environments and technological equipment to promote functional literacy and the development of skills necessary for the quality of life and social inclusion of Calabrian citizens. Research object and hypothesis. My brief contribution is the report of a teaching activity that I have carried out in the last three years with the fifth classes of students, whom I have followed as a teacher of Italian and Italian and Latin. In the written evaluations carried out during the school year, critical issues emerged due to the lack of certain skills and competences, almost always more than in the pragmatic-textual dimension, in the lexical and grammatical one. With respect to these two areas of language mastery, I intervened with the design of specific and targeted activities, in which the use of technologies represented an important element on a par with the adoption of the Valential Model and the choice to have students work also on paper; the latter was aimed at the creation of UdA that could consolidate the ability to select information and read the text carefully. In the first part of the school year, starting from the first year of the second two years, in parallel with UdA focused on Literary History and the pragmatic-textual dimension, I solicited and guided the reflection on the Macro-aspects of reading comprehension and on the skills to be implemented, with respect to the levels of difficulty of the questions of the InValsi Italian test. The use of the Institute's Computer Science Laboratory and the resources on the InValSI open website was always carried out in the second part of the school year, a four-month or five-month period in which, in order to ensure that the students were familiar with the type of test to which they would be subjected, also in terms of time, they practiced on two different simulations and were able to consult the materials and resources made available on the site.

Data used. The data used were those relating to the second and fifth classes of the Institute where I teach, relating to deficiencies in Italian in the intermediate and final assessments; to these were added those relating to the number of remedial and strengthening courses carried out in the three-year period, in order to draw an initial starting point for reflection and comparison with the results of the Learning Surveys. The reading of the latter, carried out in a comprehensive and analytical way, according to the levels of difficulty of the questions, as well as by type of questions and macro-aspects of competence,

served to bring out the critical issues in terms of the lexical dimension, the grammatical dimension and, more generally, the reflection on the language. During the current school year, the Invalsi Gym project included in the PTOF involved a certain number of hours of "training" activities for the Invalsi tests that the classes carried out in the Institute's Computer Science Laboratories; The overall figure of the fifth classes is one of the elements taken into consideration for appropriate reflections and didactic choices, which have then flowed into the proposal that is the subject of this contribution. In the background, the reading of the Invalsi Reports 2021, 2022 and 2023 remain in which the problem of implicit dropout emerges, the data relating to the students of the High School where I teach in the last three years, the ISTAT data on the reading habits of adolescents and those relating to the phenomena of functional illiteracy.

**Method or approach.** Some initial considerations arose from empirical evidence and objective elements deduced from the final mid-term evaluations, from the analysis of the students' results in the surveys of the three-year course and from the reading of the existing bibliography and which I have only partially cited in the epigraph. For the realization of the teaching activity, I adopted a laboratory approach that also aimed at moments of shared reflection to stimulate the metacognitive skills of the students also through the use of information technologies as learning facilitators. The activities related to the strictly mentioned language skills were conducted according to the Valencial Model.

**Risultati o argomentazione.** This type of activity that I have developed from year to year and in which ICT has been a relevant element only in the intermediate and final phases, wants to propose itself as a possible alternative to tests for parallel classes or to pure and simple exercises, designed and implemented to train students to take the grade 13 CBT tests. In the PTOF of the high school where I teach, in fact, there is a real project called "InValSI Gym", in which the activity I have briefly described was designed and is centered on two decisive dimensions of linguistic competence, namely lexical and grammatical competence, as well as on the adoption of the Valencial Model starting from the first year of the second two years. The starting point for me, in my case, was to experiment with a long-term approach to the problem of students' language skills, which are still below the national average. Intervening on the various dimensions of language competence, through the activity that I have described above and shared with the colleagues of the Institute and, above all, through the adoption of methodologies whose effectiveness is demonstrated by studies and research, it can be very effective to improve students' skills. The gradual methodological approach that I have adopted in the classes in which I work, has meant that starting from collective reflections and analyses with students and engaging and non-repetitive laboratory and individual activities, the study of literary texts and the functioning of the language has been addressed in a global and systematic way, so as to build language skills that draw on phases of meaningful learning. The results that can be deduced from the data returned to the Institute are encouraging, but many other factors that go beyond the Uda carried out have contributed to them. It is necessary to reduce even further, particularly in the southern regions and in Calabria in particular, the gap between the levels of competence detected in the national tests and the excellent results at the end of the State examinations which, although small, remains evident.

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**Keywords:** Functional illiteracy, Language skills, Valencial model

## **Once upon a time... a pair of magic glasses**

**Annamaria Romano - Loredana Paglialunga**

In daily life, one of the abilities that have particular relevance is represented by text comprehension (Reed, 1988). In studying, it is the same learning process that requires the student to be able to read and understand the content of what he reads, and then be able to memorize it, using it at the right time and generalizing it to other contexts. Reading is always reading to understand even when it is not strictly connected to studying as happens when you read a cooking recipe, the label of a product, the latest post on social media. But what does it really mean to understand a text? Numerous studies have demonstrated how the reader can easily understand a passage on a superficial level without finding the meaning of what he reads (Brandsford and Johnson, 1973). Understanding a text, in fact, does not mean finding the meaning of a sentence and adding it to that of the next sentence by repeating this operation until the end of the song, but requires an active construction of the content of the text. Understanding a text therefore means building a mental representation of the text (Johnson-Laird, 1983), integrating the information that the reader already has with that contained in the passage and connecting them appropriately. The INVALSI Italian test at the end of primary school represents a fundamental moment for verifying the acquisition of functional reading and, therefore, the ability to understand different types of texts. This is a fundamental and preparatory skill for future learning, but also for the exercise of active and responsible citizenship. The INVALSI Reports have highlighted a decline in the average national result, especially in the last two years (INVALSI Report 2023). Even at the level of individual educational institutions, there is a more evident decline in performance in Italian rather than in mathematics and English. The analysis of the results returned by INVALSI to each school prompts reflection, stimulates comparison, invites the search for causes and the identification of possible lines of intervention to be implemented at the level of individual class groups as well as at the school level. This work starts from the analysis of the INVALSI results of the grade 5 Italian tests for the design of an educational path aimed at enabling students to reach the Italian language proficiency goals expected at the end of primary school. The main purpose of the contribution is to illustrate the path implemented to acquire linguistic, reading and comprehension skills, not through mere training in the INVALSI tests, but through stimulating and motivating activities. In recent school years, both before and after the health emergency due to the Covid19 pandemic, the results of the INVALSI tests of the fifth classes of our Institute have shown a decline, even recording results significantly lower than those of the reference samples. The analysis of the data returned by INVALSI stimulated teachers' reflection on the causes, but also on the possible interventions to be implemented to ensure students achieve the goals of Italian language proficiency.

It immediately emerged that a very relevant element could concern the fact that the students of the Institute come from a context characterized by disadvantaged socio-economic backgrounds for which the lack of resources could effectively limit the students' learning opportunities and negatively influence their results. Added to this were reflections on the teaching methodologies used, on their validity and effectiveness in activating a teaching-learning process capable of involving, motivating and helping students acquire mastery. The need for a change was recognized, also experimenting with new strategies, to create a truly effective teaching-learning process. A path was thus put in place to promote understanding of the text starting from daily reading aloud due to the precious opportunity it offers for linguistic enrichment and the expansion of the set of prerequisites for understanding both when students do not yet possess the independent reading, or when it is seriously compromised due to the

presence of specific educational needs. Reading aloud has proven to be a highly inclusive tool, gradually allowing each student to activate increasingly complex inference processes. To this was then added the work of reading and understanding narrative texts taken from the INVALSI test files of past years.

Among the many activities proposed during the course, this contribution intends to illustrate the work carried out using the narrative text of the 2017-18 grade 5 national test created through Cooperative Language Learning. The initial activity was carried out through the use of puzzle pieces whose recomposition made it possible both to form working groups and to start the discussion through stimulus questions. Reading the text and the comprehension test carried out in groups made it possible to activate cooperative learning processes through a playful activity. Linguistic reflection activities carried out in pairs and concluded with a cross-word puzzle on the interactive whiteboard were also included in the course. Subsequently, the proposed activities were carried out via Google forms where a narrative text was presented, again taken from the Gestinv site, with the related items. The use of this type of activity interested and intrigued the students to the point that they asked to learn how to create Google forms. Consequently, they began to carry out activities, individually or in pairs, by searching for texts online and creating questions for linguistic comprehension or reflection which they then sent to their classmates by launching real "challenges". The working method allowed the students to acquire skills and to face the INVALSI tests with serenity, the very positive results of which confirmed the effectiveness of the course.

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**Keywords:** Cooperative language learning, Skills, Active citizenship

## Evaluate for skills: INVALSI Test Framework, evaluation rubrics, R.I.Z.A. model

**Roberta Strocchio - Alessia Ieva - Annamaria Moiso**

Madre Mazzarello Institute includes primary school, secondary school, and high school with three fields of study (languages, science and human studies). Starting from the academic year 2020/2021, the school has completely renewed its vertical curriculum and from 2023/2024 a vertical pedagogic team was born, composed by teachers of all grades. The first theme that the team decided to study and deepen was that of evaluation based on the studies by Roberto Trinchero, Alessio Tomassone (Edurete study

group), Franca Da Re and Cristiano Corsini. After a period of study, we contacted the Edurete group and started, as a team, a refresher course with professors Trincherio and Tomassone on training, design and formative evaluation. At the same time, teachers of the department of Italian Language, with the association "Casa degli Insegnanti", had the opportunity to meet, on the theme of evaluation, professor Da Re. The whole school year has been dedicated to the experimentation of headings and evaluation grids.

The research. The aim of this research was to experiment teaching by skills in school while working in teams and involving students. As highlighted by Trincherio and Tomassone, competence is manifested when a subject "mobilizes, activates?, integrates, coordinates, orchestrates a complex of elements to address and solve problem-situations (especially real life) never previously faced in that form".

In order to develop students' skills it is necessary to build specific educational activities, that are to be structured and evaluated according to the R.I.Z.A. model (Resources - Interpretation - Action - Self-regulation).

Invalsi texts, based on reading and comprehension, are a good starting point because they are new "situations - problems", on which students can measure the understanding of their language and textual skills. Starting from them, we have built sections of evaluation and self-assessment that have allowed us to reflect, both among teachers and with students, on the meaning of evaluation that, as Corsini stated, isn't a marginal procedure of teaching, but a "useful process to improve teaching and learning": evaluating means "giving value", that is the necessity to convey indications of improvement.

Data used. For the construction of the project the teachers used the Invalsi Test Framework of Italian, focusing on the macro-aspects of reading comprehension:

- Localize and identify information in the text, which requires the tracing within the text of that given information.
- Reconstructing the meaning of the text, locally or globally, that involves all the processes by which the reader constructs a representation of the literal meaning of the text.
- Reflecting on the content or the form of the text, at the local or global level and evaluating them, a process that involves taking a distance from the text and looking at it from the outside to understand its content going beyond its literal meaning, or to appreciate its stylistic and formal characteristics.

In addition to the Invalsi Test Framework of Italian, we used professor Trincherio's R.I.Z.A. model, which was crucial to work on cognitive processes, competences and evaluations of these ones.

Method. A laboratory approach was adopted, involving first-hand pupils from the classes chosen for the experiment.

The project was divided into the following phases:

- Administration of the Invalsi test.
- Study by students of the Framework of Reference of Tests Invalsi of Italian, especially the reading comprehension part.
- Study of the R.I.Z.A. model, trying to answer to pupils' questions "What is a competence?" and "How we can evaluate a competence?"
- Construction on an evaluating grid.
- Use of the grid to ascertain and evaluate reading comprehension from texts administered during the Invalsi tests.

In September the project was presented to the classes involved and some texts of an Invalsi test were submitted to them.

This has generated a reflection on the typology of the texts chosen for the test and we wondered about the elements that Invalsi proposes to evaluate through these; so, reference has been made to the Framework of Reference of Tests Invalsi of Italian to understand the aspects that are at the origin of the construction of a test. Students understood that three macro-aspects of reading competence are investigated: localizing and identifying, reconstructing, reflecting.

Then, we went on with the second phase of study and the teachers proposed to the classes the R.I.Z.A. model: this allowed to answer some questions by the students on skills and on how to define and evaluate them.



Therefore, pupils, divided into groups, worked on the areas of the R.I.Z.A model, interpretation-action-self-regulation, with the aim of building a grid that evaluated the understanding of the text.

Finally, a new Invalsi test was administered, which was evaluated with the product of the experiment and an improvement in the results was found, due to a greater awareness of the mechanisms and logic of Invalsi's investigation.

The results. The experimentation has significantly increased the awareness of the students and, above all, of the teachers, regarding formative evaluation and self-assessment, that have always been problematic, in order to make them functional to the improvement of teaching and learning.

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**Keywords:** Evaluation, Reading comprehension, R.I.Z.A. model

## An experimentation on active methodologies using Project Based Learning

**Giuseppe Lo Cascio - Simona Berlini - Paola Doghieri - Davide Cannizzaro**

In daily life, one of the abilities that have particular relevance is represented by text comprehension (Reed, 1988). In studying, it is the same learning process that requires the student to be able to read and understand the content of what he reads, and then be able to memorize it, using it at the right time and generalizing it to other contexts. Reading is always reading to understand even when it is not strictly connected to studying as happens when you read a cooking recipe, the label of a product, the latest post on social media. But what does it really mean to understand a text? Numerous studies have demonstrated how the reader can easily understand a passage on a superficial level without finding the meaning of what he reads (Brandsford and Johnson, 1973). Understanding a text, in fact, does not mean finding the meaning of a sentence and adding it to that of the next sentence by repeating this operation until the end of the song, but requires an active construction of the content of the text. Understanding a text therefore means building a mental representation of the text (Johnson-Laird, 1983), integrating the information that the reader already has with that contained in the passage and connecting them appropriately. The INVALSI Italian test at the end of primary school represents a fundamental moment for verifying the acquisition of functional reading and, therefore, the ability to understand different types of texts. This is a fundamental and preparatory skill for future learning, but also for the exercise of active and responsible citizenship. The INVALSI Reports have highlighted a decline in the average national result, especially in the last two years (INVALSI Report 2023). Even at the level of individual educational institutions, there is a more evident decline in performance in Italian rather than in mathematics and English. The analysis of the results returned by INVALSI to each school prompts reflection, stimulates comparison, invites the search for causes and the identification of possible lines of

intervention to be implemented at the level of individual class groups as well as at the school level . This work starts from the analysis of the INVALSI results of the grade 5 Italian tests for the design of an educational path aimed at enabling students to reach the Italian language proficiency goals expected at the end of primary school. The main purpose of the contribution is to illustrate the path implemented to acquire linguistic, reading and comprehension skills, not through mere training in the INVALSI tests, but through stimulating and motivating activities. In recent school years, both before and after the health emergency due to the Covid19 pandemic, the results of the INVALSI tests of the fifth classes of our Institute have shown a decline, even recording results significantly lower than those of the reference samples. The analysis of the data returned by INVALSI stimulated teachers' reflection on the causes, but also on the possible interventions to be implemented to ensure students achieve the goals of Italian language proficiency.

It immediately emerged that a very relevant element could concern the fact that the students of the Institute come from a context characterized by disadvantaged socio-economic backgrounds for which the lack of resources could effectively limit the students' learning opportunities and negatively influence their results. Added to this were reflections on the teaching methodologies used, on their validity and effectiveness in activating a teaching-learning process capable of involving, motivating and helping students acquire mastery. The need for a change was recognized, also experimenting with new strategies, to create a truly effective teaching-learning process. A path was thus put in place to promote understanding of the text starting from daily reading aloud due to the precious opportunity it offers for linguistic enrichment and the expansion of the set of prerequisites for understanding both when students do not yet possess the independent reading, or when it is seriously compromised due to the presence of specific educational needs. Reading aloud has proven to be a highly inclusive tool, gradually allowing each student to activate increasingly complex inference processes. To this was then added the work of reading and understanding narrative texts taken from the INVALSI test files of past years.

Among the many activities proposed during the course, this contribution intends to illustrate the work carried out using the narrative text of the 2017-18 grade 5 national test created through Cooperative Language Learning. The initial activity was carried out through the use of puzzle pieces whose recomposition made it possible both to form working groups and to start the discussion through stimulus questions. Reading the text and the comprehension test carried out in groups made it possible to activate cooperative learning processes through a playful activity. Linguistic reflection activities carried out in pairs and concluded with a cross-word puzzle on the interactive whiteboard were also included in the course. Subsequently, the proposed activities were carried out via Google forms where a narrative text was presented, again taken from the Gestinv site, with the related items. The use of this type of activity interested and intrigued the students to the point that they asked to learn how to create Google forms. Consequently, they began to carry out activities, individually or in pairs, by searching for texts online and creating questions for linguistic comprehension or reflection which they then sent to their classmates by launching real "challenges". The working method allowed the students to acquire skills and to face the INVALSI tests with serenity, the very positive results of which confirmed the effectiveness of the course.

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**Keywords:** Experimentation, Project, Active methodologies, Co-presence, Interdisciplinarity, Cooperation, PBL

# **SESSION 5. SCHOOL SELF-EVALUATION, EXTERNAL EVALUATION AND IMPROVEMENT**

**ORGANIZER: INVALSI**

**COORDINATOR: GIORGIO CAVADI**

**DISCUSSANT: PAOLO MAZZOLI**

**18 OCTOBER: 11 AM -13 PM {ROOM 3 – TEACHING 5}**

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## **External Evaluation for School Improvement: A European Perspective through Qualitative Systematic Review**

**Michela Freddano - Ilaria Salvadori**

Introduction. In the Italian school system, the external evaluation of schools was introduced by Presidential Decree 80 of 29 March 2013, Regulation on the national evaluation system in education and training, as the phase of the evaluation process that contributes to the improvement of the quality of education and learning, through the implementation of external evaluation visits. The other phases are self-evaluation, improvement actions and social reporting. External evaluation visits are conducted by External Evaluation Teams, according to a programme and protocols adopted by the Conference for the Functional Coordination of the National Evaluation System.

The external evaluation of schools has a strategic role in promoting the quality of the educational offer and its main purpose is to produce useful evidence for the “redefinition of improvement plans by the school institutions on the basis of the results of the analysis carried out” by the External Evaluation Teams (At. 6. c. 1.3).

This contribution deals with the concept of external evaluation of schools from a methodological point of view with the purpose of identifying good external evaluation practices and reflecting on how they affect improvement.

Research object, objectives and hypothesis. In view of this particularly innovative topic in Italy, INVALSI has launched a study on the impact of external evaluation on schools’ self-evaluation processes and improvement. The research presented in this contribution represents the first phase of a study and has the aim of answering the following research questions: a) Are there studies that support the thesis that external evaluation practices impact on school improvement? b) Which external school evaluation practices impact on improvement? c) Which improvement processes emerge?

Approach. A qualitative systematic review of the literature (Butler et al., 2016; Ghirotto, 2020), of a descriptive type with an aggregative objective, was conducted using the systematic review tool and the PRISMA statement protocol (Moher et al, 2015), with the aim of investigating the literature to detect whether and which studies and research were produced to support the research questions.

The qualitative systematic review allowed for a secondary level analysis that was able to bring together primary research findings to inform practice through emerging evidence from the relevant literature.

The initial review protocol made explicit the inclusion and exclusion criteria to be considered: the reference period (the last ten years, chosen in consideration of the fact that Our Evaluation System was born in 2013); the reference context (Europe); the type of articles (peer-reviewed, published with the keywords defined in the title); contents (educational, school-based); the language of publication of the contributions (English, French, German, Spanish and Italian); the reference databases (general and citation: Education Source, APAPsychinfo, ERIC, Scopus, Web of Science; the electronic archive JSTOR; the Scholar Google search engine). The search query used the following words in a combined and alternative way: school inspection OR external evaluation AND improvement (with the condition that they are present in the title), evaluation feedback AND effectiveness OR outcomes OR impact AND school self-evaluation AND accountability (present in the abstract and/or text).

This step resulted in the detection of 499 records which, after reading the titles, applying the exclusion criteria, in the screening phase with reading of the abstracts (n=260) and removal of duplicates, became 153 valid records for eligibility.

The 153 articles were categorised based on the country being studied, the objectives set, the research design, the type of analysis (qualitative, quantitative, or mixed methods), the reference theory (if any) and the stated outcomes. The categorisation of the title-abstract pair revealed three macro-categories of studies: 1) Analysis, i.e. analysis of the external evaluation systems in the various countries, (n=93); 2) Stakeholders, the opinions on the subject of external evaluation by stakeholders (inspectors, teachers, managers, students and parents) (n=40); 3) Impacts, the effects of external evaluation visits on schools and the use of feedback for improvement purposes (n=20).

The macro-category "Impacts" is the subject of in-depth study in this paper; therefore, the 20 contributions identified were read with the aim of answering the initial research questions.

Results. The results show how external evaluation visits are being debated on a European level. The reading of the various papers highlights the need for action on several fronts: an appropriate school organisational structure that is open to welcoming external evaluators and, at the same time, external evaluators who set clear expectations and reference standards to guarantee the quality of the processes implemented (Hofer et al., 2020); inspection models that, in addition to regular visits, also evaluate educational practices and published self-evaluation reports to strengthen schools' self-evaluation processes (Ehren et al., 2015) and impact mechanisms in low-income countries' schools. When external evaluation is carried out on processes, the feedback received helps to guide school improvement (Ólafsdóttir et al., 2022; Scheerens and Ehren, 2015) and implies greater involvement of teachers in the same triggered mechanisms. Data collected by external evaluators can have a positive impact on the quality of the school, a more limited impact, or even fuel a state of tension and stress in the staff of the school being evaluated.

The scientific literature analysed on the improvement of external evaluation processes in the European context can provide indications and suggestions for Italian educational policies. The preliminary results of the analysis show that the evidence on the impact of external evaluation processes in schools is heterogeneous, an indication of the need for further research in the field.

External evaluation may be able to generate long-term positive effects by affecting organisational changes, at micro-social levels, and on decision-making processes, at micro and macro level. The results of the qualitative systematic review performed represent a broadening of knowledge in the sector of evaluation in education and can become an opportunity to reinterpret and enrich the processes, procedures, and instruments for the external evaluation of schools in our country.

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**Keywords:** External evaluation of schools, Improvement, Qualitative Systematic Review, Impact

## **The school I would like**

**Pasqualina Maria Zaccheria**

The basic idea underlying this work is to offer a contribution to the whole school, students, teachers, managers, staff and decision-makers of school policies, from different points of view that arise from the school experiences lived as a teacher, manager school, technical manager, INVALSI evaluator and even before that as a mother and student.

The title "the school I would like" represents a secret dream, as a person from school who has experienced, from different perspectives, the different seasons of reforms, and as a person from the South who, through his work and with the few means to disposition, tried to redeem the school and the territory by leveraging human capital, a precious resource, in a sometimes virtual and evanescent world. The different work experiences have allowed me to look at school with always different eyes, above all, through those of the children. This contribution aims to give a voice to those who experience school and wish to improve it, to those who imagine school to be different from what it is, to those who need to know the users' points of view to give concrete answers.

An important role in my work experience was played by knowledge of the context, as I live in a region of southern Italy, and my ability to establish an empathetic relationship with the students, to whom I would have liked to give concrete and immediate answers, but, often times, I felt helpless and disillusioned.

As part of the PON Project "Valu.E - Expert Evaluation/Self-Evaluation", approved by the MIUR in 2015 and promoted by INVALSI, I coordinated, both in the first phase of the 2018/19 experimentation and during the second experimentation of the year 2023, some groups of experts called "External Evaluation Units", for the "Experimentation of new tools and procedures for the external evaluation of schools", with the aim of collecting evidence, starting from the contents present in the RAV and from the various documents that have been drawn up (such as the PTOF and the Social Reporting), in order to support the school in continuous improvement.

The second phase of the project which took place in 2023 involved 180 randomly selected educational institutions in the experimental research activity.

The NEVs were made up of three components: a coordinator (technical manager of the MIM or school manager), an expert from the school (school manager or teacher), and an expert external to the school world, with experience in social and evaluative research or in the field of organizations (university researcher, expert in the field of organizational evaluation, etc.). The presence of figures with different profiles and experiences ensured a plurality of points of view during the evaluation process.

The evaluation process of educational institutions involved four phases: self-evaluation, external evaluation, implementation of improvement actions and social reporting.

At the end of the external evaluation visit, the NEV expressed considerations on the priorities and process objectives and an evaluative judgment on the areas of Outcomes and Processes, with respect to coherence with the overall situation of the school.

The various school components were involved and offered their point of view on the different aspects of the areas and sections of the RAV. Individual and group interviews were conducted, documents produced by the school were collected and the school spaces were visited.

Everything took place in the utmost confidentiality of the interviews.

The schools in which I coordinated the NEVs, during the first experimental phase of 2018/19, fell in the southern areas of Italy, Calabria and Sicily, while the schools subject to the second 2023 experimentation fell in the regions of central and northern Italy, I therefore had the opportunity to compare processes and outcomes in totally different territorial areas of the country.

Coordinating the NEVs in different areas of Italy was a personal and professional choice, dictated by the fact that as a Calabrian and a person from school I needed to give myself answers to the reasons for such a gap in a territorial area rich in ideas and of culture and what was causing impoverishment over time.

The external evaluation report was based on the analysis and comparison of the following areas: Context; Outcomes; Processes - Educational and teaching practices; Processes - Management and organizational practices, Priorities.

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**Keywords:** Evaluation, Training, Educational success, Inequalities

## The experimental visit for school external evaluation: evidence from three case studies

Emanuela Vinci - Cristina Stringher

Our work concerns school external evaluation (OCSE 2013; Phelps, 2014; Scheerens, 2000) conceived as a form of evaluation that is "typically conducted by an external agency and involves a sequence of activities which may begin with self-reflection by the school, includes a visit by an external evaluator or team of evaluators, and leads to a summative report which may be published and may require a follow-up process (OECD, 2013: 87).

The Italian experimentation and tryout of new tools and procedures for school external evaluation according to Action 2 of the PON Valu.E Project (Expert school evaluation/self-evaluation) included the realization of school external evaluation visits, regulated differently from the procedures set out in Article 6 of Presidential Decree 80/2013. The experimentation and tryout were aimed at testing new tools, with updated modes and procedures for external evaluation, and with the technological support offered by the dedicated SVEVA platform.

Between September and October 2023, experimental external evaluation visits have been carried out in 159 schools by newly constituted external evaluators groups (NEV in Italian), that for the first time conducted all foreseen operations through the digital platform integrated with the National Evaluation System of the Ministry of Education and Merit.

In this study, we concentrated on the perception of school external experts on strengths and weaknesses emerging during the external evaluation pathway (Freddano e Pastore, 2020; INVALSI/Conferenza per il coordinamento funzionale del Sistema Nazionale di Valutazione, SNV in Italian, 2016), by analyzing the study cases of three schools located in North-East Italy (Emilia Romagna, Friuli Venezia Giulia and Veneto regions) visited by NEVs.

The objective of our study was to collect information on these experiences, with the aim of identifying advantages and potential areas of improvement useful for adjusting the theoretical model informing school external evaluation, in view to its future scaling up at national level.

The relevance of this current work lies mainly in that it has been conducted by two researchers that perform their duties within the INVALSI Area of school evaluation. Both researchers performed the role of expert in research methodology within the external evaluation groups. Such condition offered a dual advantage: on one side, it allowed us to observe all the phases planned for this process from an external

position, since we participated in person to school evaluation visits; on the other hand, being INVALSI researchers allowed us to maintain an insider perspective, linked to a deep knowledge of INVALSI tools and procedures defined by the underlying methodology. For a description of the protocol for the external evaluation visit, we refer to the document of the Committee for the functional coordination of the Italian National Educational Evaluation System (INVALSI/Conferenza per il coordinamento funzionale del Sistema Nazionale di Valutazione, SNV in Italian, 2016).

Our main study questions have been:

1. In which way was the experience of school external evaluation conducted in the study cases (Stake, 1999; Yin, 2003), with reference to the protocol proposed by INVALSI?
2. In which way did the tools experimented during fieldwork function against the foreseen objectives and timeframes?
3. Which reflections emerging from this experience of school external evaluation may orient the scaling of this procedure up to system level?

Our methodology is framed within a qualitative perspective and makes use of techniques for computer-assisted content analysis with the MAX QDA Analytics Pro software (Braun e Clarke, 2006; Losito, 2007; Mayring, 2014).

The qualitative content analysis concerned all the documents used throughout the phases of this process, and particularly:

- tools Prior to the visit;
- tools During the visit, including interviews to involved stakeholders (students, teachers, President of the school council)
- tools After the visit;
- external evaluation reports
- use of the SVEVA platform for external evaluation.

Besides these official documents, researchers also recovered fieldnotes containing further elements not included in the report drafted in the phase "During the visit".

Preliminary results show how working on a dedicated platform was essential for external evaluation groups, since it enabled them to organize the visit from initial contacts with the schools all the way through the presentation of the report on the external evaluation visit. In addition, in the SVEVA platform NEV could access all the documents useful to analyse the extant situation of individual schools. In fact, following the current digital innovations involving all Public Administration sectors (Legislative Decree 82/2005), INVALSI developed a digital infrastructure that has proved fundamental to provide a logical structure and to regulate visit methods and timings.

A second crucial point of this experience concerned the possibility of creating and building the external evaluation group. Such group creation was also enabled by the platform, which allowed to triangulate the different perspectives of the experts involved in each visit (Stake, 1999). The information data flow permitted synchronous and asynchronous interactions among the NEV components. However, we felt more time was necessary for the formation of the external evaluation group also in terms of relationships among components, that are often persons that have just met in this occasion and have to work together for the first time. In this vein, we underline that each NEV component seemed to bring its own working and relationship style, that has to be considered so to harmonize the group once it is formed. In the initial phases of the training for external evaluation experts this aspect merits attention, considering that they are all professionals in their respective fields. Central seemed the training received by external evaluators in building and maintaining a profitable and productive relationship within the group and with the school staff involved during the external evaluation visit.

From the experience of the interviews carried out with teachers, students and parents, we could thoroughly understand the level of emotional, cognitive and functional involvement of all stakeholders in the actions undertaken by the schools in order to guarantee the quality of their local curriculum. We detected the presence of different levels of awareness of the causal links between the organization of didactic and managerial processes and the improvement in student outcomes, from an empowering perspective (Fetterman e Wandersman, 2005) of all these parties involved.



Apart from these results, we also identified aspects that could be improved, such as the length in the completion of some fields of the tools used in the phases prior and during the visit. In our contribution we will dive deeper into these aspects, with the aim to contribute to revising tools and procedures of schools' external evaluation, in view of its national scaling up.

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**Keywords:** School external evaluation, Case studies, Qualitative analysis, External evaluation groups

## Defining RAV priorities and their impact on educational and academic success

**Simone Paolo Achilea**

Introduction: school's strategic documents. This work follows a deductive methodology (from the general to the specific) and is the result of a careful analysis of a comprehensive institute (IC *Valli e Carasco*) located in eastern Liguria, in the province of Genoa.

The journey begins with a quick focus on the logical sequence of the school's strategic documents in order to ensure consistency among them:

1. Social reporting related to the past three years, in order to assess the results actually achieved and the development prospects for the new three-year period. It is a bridge between one triennium and the following one, because it focuses on what has been achieved and the results actually attained in the triennium that has just ended.

2. Self-evaluation report (RAV) for the new three-year period through which, considering the reported results and the new analyses, priorities and targets to be achieved at the end of the new triennium are set. It is therefore the tool that guides the self-evaluation and launches the new three-year period by defining the priorities to be achieved and identifying the process objectives.
3. Improvement plan Once the self-evaluation process is completed, the school accordingly plans pathways and actions to achieve the goals set through the Improvement Plan, which is an integral part of the Triennial Plan of Educational Offer - PTOF.
4. The Triennial Plan of Educational Offer (PTOF) starts from the analysis of both context and priorities defined in the RAV, taking into account the priority educational objectives (art. 1, paragraph 7, law 107/2015) and the educational, organisational, curricular and extracurricular outlines that individual schools adopt within their autonomy.

#### Self-evaluation report

When drafting the self-evaluation report, the School Principal and the internal evaluation team will have to deal with 4 sections:

- Context and Resources. Constraints and opportunities for improvement based on the territorial and institutional context, in order to define the importance of education and training, according to the territorial location through self-evaluation;
- Outcomes. Pupils' academic results, obtained both within the school and through external assessment tests such as the ICILS tests;
- Processes (educational and teaching - organisational and management practices). This involves a thorough analysis of the school in all its parts, from the students to the PTOF and the management of professional figures. The self-evaluation starts by comparing with previous self-evaluations outlining critical issues, problems and shortcomings, and then introducing future corrective actions aimed at making improvements.
- Identification of Priorities. Planning all the necessary improvements as per the analysis and the self-evaluation, by defining the priorities and timelines of each intervention through organisational strategies.

In the school's self-evaluation process, it is important to promote and support the direct involvement of the entire school community, also by promoting meetings and by sharing objectives and operating methods.

Priorities and targets: a Duo for educational success. For illustrative purposes, the concluding elements of the RAV are herewith examined: Priorities, Targets and Process Objectives and their impact on educational and school success.

The following offers a snapshot of a single priority-target duo that takes into account the results in the National standardised tests as the reference data.

The priorities arise from the data of the National Tests and from the Institute's self-evaluation Report, where the school results and the feedback from teachers, pupils and parents who took part in the questionnaires are analysed.

Priority: To reduce discrepancies among classes.

Target: To make classes more uniform in the acquisition of knowledge and skills.

Process objectives:

- Making classes more uniform in the acquisition of knowledge and skills

Tools and resources:

- Common disciplinary curricula
- Disciplinary and interdisciplinary learning units: UdAs
- Teachers' training process

Methods:

- Documents/formats preparation during team/class council meetings, disciplinary departments and in the Teachers' Board, with a view to the curriculum verticalization.
- Teachers' training right and duty (art. 36 CNL Education and Research 2019 2021) with the collection of the training needs of teaching staff and the activation of school and/or district network training units.

- Promoting systemic actions of prevention, recovery and enhancement

Tools and resources:

- Mentoring and guidance pathways
- Basic skills enhancement, motivation and support pathways
- Co-curricular training and workshop pathways
- Extra-curricular remedial courses (Italian, mathematics, foreign languages, etc.)
- Extra-curricular enhancement courses (Latin, drama, mathematics, foreign languages, etc.)
- Use of the autonomy staff resources (including enhancement)
- External professional resources

Methods:

- Project: Actions for preventing and combating school dropout - PNRR Mission 4: Education and Research - Component 1 - Education services supply strengthening: from nursery schools to universities. Investment 1.4 - Extraordinary intervention aimed at reducing territorial disparities in first and second grade secondary schools and combating school dropout
- Activities and projects planned by the educational institution
- Reducing cheating behaviours

Tools and resources:

- Analysis of ICILS tests results
- Setting up a suitable environment for the administration of standardised tests
- Drafting and getting familiar with verification tests that are consistent with the reference frameworks and the ICILS question standards
- Common assessment grids
- Control actions: active supervision, adoption of all appropriate measures to ensure a smooth carrying out of the tests
- Administration and possible tabulation carried out by non-class teachers
- Involvement of teaching and ATA staff (AA, CS, AT)

Methods:

- Team sharing of the results and elaboration of the tests/assessment grids during meetings/class councils, in disciplinary departments and the Teachers' Board.
- Involvement of school staff in structuring the setting, supervision, administration, technical assistance and correction procedures.
- Making evaluation homogeneous

Tools:

- Common tests for parallel classes (initial - intermediate - final)
- Common assessment grids
- Common assessment rubrics
- Assessment protocols
- Teachers' training process

Methods:

- Elaboration/approval of tests/scales/rubrics/assessment protocols in team meetings, disciplinary departments and in the Teachers' Board, also taking the verticalization of the curriculum into account.
- Teacher training right and duty (art. 36 CNL Education and Research 2019 2021) with the collection of the training needs of teaching staff (through survey forms) and consequent activation of school and/or district network training units.

Conclusions. The school's strategic documents, specifically the RAV, have an impact on the educational and school success of pupils because they play a fundamental role in the learning process of each individual.

The school provides knowledge, skills, competences, but is also responsible for the development of students' social and relational skills.

Through their interaction with peers and teachers, they learn important values such as citizenship, collaboration, inclusion, social justice and gender equality.

In addition, the school offers their students the opportunity to explore different disciplines, discover talents and grow passions. It is also a place where critical thinking and problem-solving skills are nurtured, so as to face the challenges of everyday life.

In short, the school, through strategic documents, plans, implements and monitors their actions, with the primary goal being the educational and school success of every student.

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**Keywords:** Self-assessment, Priority, Goal, Educational success

# **Rethinking Priorities: Evidences from the Experimentation of New Tools and Procedures for the External Evaluation of Schools**

**Ilaria Salvadori - Daniela Torti**

Introduction. Within the framework of the Regulation on the national evaluation system in education and training (Presidential Decree 80/2013), at the conclusion of the self-evaluation process, the school institutions through the Internal Evaluation Teams formulate priorities, which consist of general objectives that the school intends to achieve in the long term through appropriate improvement actions. The school also defines expected goals, consisting of observable and measurable results, which will be account at the end of the three-year period (INVALSI, 2022). To achieve these goals, operational objectives are also identified on processes that contribute, in the short term, to achieving the priorities. Their definition is essential for the organization of the improvement actions. Thus, the self-evaluation process is presented to the schools as a moment of reflection on their performance and of looking towards the future.

In the context of the external evaluation, the External Evaluation Team (EET) comes to the shared expression of the external evaluation judgment and, after an accurate process of triangulation (Denzin, 2012) expresses its considerations with respect to the priorities and process objectives indicated by the schools in the Self-Evaluation Report (SER), with the aim of providing useful indications for their improvement. The EET drafts an External Evaluation Report (EER) that the EET coordinator will present to the school during the so-called feedback visit, in which school will receive feedbacks on its situation. The opinion expressed by the external evaluation has no normative implications for schools, which are free to decide whether to listen to the considerations expressed by the EET and, consequently, whether to update their priorities in the light of the received feedback.

The experimentation of new tools and procedures for the external evaluation of schools, carried out in the framework of Action 2 of the PON project Valu.E (Evaluation/Self-Evaluation Expert) - 10.9.3.A - ESF PON 2015-1, Axis I "Education", Specific Objective 10. 9 "Improvement of schools' capacity for self-diagnosis, self-evaluation and evaluation and to innovate teaching by adapting it to the contexts", at the beginning of the school year 2023/2024, has foreseen the realisation of external evaluation visits to 159 institutions in Italy that voluntarily joined the project. The return of the EER by October 2023 made it possible for the participating schools to update the outcome priorities in their SER, in line with what is indicated in the ministerial note DGOSVI prot. no. 31023/2023.

Research object, objectives and hypothesis. Based on these considerations and taking into account the innovative character of the topic, the study of schools' attitudes to the formulation of their own priorities following external evaluation becomes of interest in analysing the effect of external evaluation on school improvement processes. The initial question we addressed was what actions were taken by the schools following the external evaluation visit, whether the 159 schools that received the external evaluation visit in the period September-October 2023 followed the considerations expressed by the EETs indicated in the External Evaluation Report for the formulation of priorities, targets, and process objectives. The starting assumption is that if the visit was conducted according to effectiveness criteria, the school is expected to welcome the EET's considerations of outcome priorities as indications for new improvement planning.

Method and data. A mixed method had been used in this research as it makes use of an initial documentary analysis, followed by a quantitative analysis phase and a qualitative analysis phase to be conducted in a sub-sample of schools. To be able to identify clusters of schools based on their attitudes, the priority section of the 2022-2023 SERs was compared with that of the 2023-2024 SERs and the EERs for all 159 educational institutions. The data were collected in a properly coded data matrix.

The indications expressed by the EETs were considered according to the criteria indicated in the "Instrument after the visit": 1. shared priority; 2. partly shared priority; 3. not relevant priority, no other priority is suggested as an alternative; 4. not relevant priority, another priority is suggested as an alternative.

Based on the data collected, a first level of descriptive analysis was carried out, followed by an in-depth analysis with reference to socio-territorial variables, to identify peculiarities with respect to the defined typology.

Results. The study focused on the impacts of external evaluation and the perceived quality of visits by schools.

Firstly, it was possible to observe how schools distribute themselves with respect to their attitude towards the considerations provided by the external evaluation. The documentary analysis provided for each school a coding of the data in three sections: a) comparison between 2022/23 SER and 2023/24 SER; b) actions of the school; c) considerations regarding the effectiveness of the priorities. In the first section we wanted to indicate whether, in the 2023/24 SER, the priorities, targets and process objectives were modified with respect to the 2022/23 SER by the school, either completely or partially, or whether they were not modified at all; in the next section we noted whether the school followed, did so in part, or did not follow the indications of the EETs in the formulation of priorities, targets and process objectives in the 2023/24 SER. The third section concerns the researchers' reflection on the wording of priorities by both schools and the EETs.

The results describe how many schools accept all the considerations of the EETs and modify the priorities as indicated, or follow them by further elaborating them; how many schools partially modify the priorities; how many schools do not modify the priorities.

The same data are then put in relation to the available information on schools to identify trends with respect to the identified groups, making it possible to draw a general picture of the situation and to make an initial assessment of the effect of external evaluation on the self-evaluation and improvement processes of educational institutions.

The paper illustrates a work that is being progressively carried out and that involves dealing with variables in attitudes towards external evaluation and case studies that go in depth to learn about the mechanisms that underpin the processes of self-assessment, external evaluation, and improvement. In this sense, external evaluation takes on public significance and value for both the school and the public with a view not only to accountability but also to learning in organisational contexts.

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**Keywords:** External Evaluation of Schools, Priorities, Impacts, Documentary analysis

# **SESSION 6. DIGITAL TRANSITION, ASSESSMENT OF AND DIGITAL COMPETENCES**

**ORGANIZER: INVALSI**

**COORDINATOR: PAOLA GIANGIACOMO**

**DISCUSSANT: DAVIDE AZZOLINI**

**18 OCTOBER: 11 AM - 13 PM {ROOM 4 – TEACHING 6}**

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## **Assessment of students' digital competences: systematic literature review**

**Marco Giganti**

Introduction. This contribution is part of the initial phase of a research project aimed at construction, in collaboration with INVALSI, of the scale at which it will be used to describe the results of the standardised digital skills assessment test at the end of compulsory education (10th grade).

Digital skills are at the top of the European political agenda, aiming to improve them for digital transformation. The European Skills Agenda (EU, 2020) promotes digital skills and supports the objectives of the Digital Education Action Plan (EU, 2021a) for the development of a high-performance digital education system. The Digital Compass (EU, 2021b) and the European Pillar of Social Rights Action Plan (2021c) set targets to reach at least 80% of the population with basic digital skills and 20 million ICT specialists by 2030. In Italy, the current legislation (PNRR) provides for the country to equip itself with a system of certification of digital skills from 2025.

It is therefore necessary to define what is meant by digital skills and to measure them. In this perspective, INVALSI, the National Institute for the Evaluation of the Education and Training System, is launching the DIGCOMP.MIS project to define a prototype model to attest digital skills, applicable for spring 2025; Reference are students of 10<sup>th</sup> grade, but with the prospect of observing the evolution of digital skills from the end of secondary first grade to the end of secondary second grade.

The framework assumed by INVALSI, and the research project is DIGCOMP 2.2. (Digital Competence Framework for Citizens, Vuorikari et al., 2022) developed by the European Commission to describe and evaluate the digital skills of citizens aged 16 and over. From 2013 to today, DigComp has found application in the context of employment, education, training and lifelong learning; it has been adopted at European level to build the Digital Skills Indicator and to monitor the Digital Economy and Society Index.

Specifically, the research project deals with the definition of the levels of digital competence and the adequacy thresholds corresponding to the different school grades.

In large-scale educational surveys, often the variables considered consist of skills, knowledge or competences possessed at a stage of the school career or in a given age group, constructs not directly observable but defined on the basis of a theoretical reference framework and operationalized to administer standardized tests.

An outcome in terms of numerical score, however, is not directly informative of what students with a given score know and are able to do with respect to the investigated domain; this is a limit for those interested in interpreting the results of a survey and to obtain information for interventions or teaching practices.

The attribution of an explicitly described level allows students, families and teachers to have significant feedback, which can be integrated by the student to their own perception of competence and useful for teachers for teaching. Many national and international surveys combine a score result with a description of the corresponding level; similarly, INVALSI does.

Subject matter, objectives and research assumptions. The object of this contribution is the presentation of the results of the Systematic Literature Review conducted in the initial phase of the research project. This revision is considered necessary because some have been found but limited to primary school (Godaert et al., 2022) and some assessment tools (Mattar et al., 2022).

The general objective is the collection and systematic review of literature on the topic of research. This action is necessary for two reasons: to respond to a need for scientific knowledge and to offer the project a theoretical-conceptual framework, as far as possible, complete.

Two levels are outlined in this project:

- a. Evaluating students' digital skills (more pedagogical and docimological)
- b. The transition from the measuring scale to the threshold levels (more psychometric in nature).

In both cases the research questions are formulated in this way:

- What are the methods and tools for assessing students' digital skills?
- What are the psychometric techniques underlying the transition from the measuring scale to the threshold levels?

In response to both questions and for the project in place, the research hypotheses are:

- a. Standardized INVALSI tests based on the Item Response Theory model
- b. Using the techniques identified by INVALSI and following a standard referenced or descriptive proficiency score approach.

In terms of scientific knowledge, however, it is useful to collect all the modalities provided by the literature and to describe in depth those identified by INVALSI.

Data used. For the systematic review of the literature, two repositories of scientific articles were chosen and others containing grey literature were consulted:

- Database: ERIC and Scopus.
- Grey literature: OpenGrey (<http://www.opengrey.eu>); OpenDOAR (Directory of Open-Access Repositories; <http://v2.sherpa.ac.uk/opensoar/>); European Commission; OECD; UNESCO; Ministry of Education and Merit; INVALSI.

Method or approach. The method used for the Systematic Literature Review is qualitative and specifically a Meta-synthesis is conducted (Siddaway et al., 2019).

The following search strings have been identified: competence assessment (competence OR skill AND assessment); digital skills (digital AND competence OR skill); measurement scale (measurement AND scale); threshold level (Threshold AND level); measurement scale and threshold levels: (measurement AND scale AND Threshold AND level); standardized assessment of students' digital skills (students AND digital competences (OR skills) AND standardized assessment).

The following inclusion/exclusion criteria have been defined: articles from 2013 (year of publication of the first version of DIGCOMP); articles in English/Italian; peer review articles; methodological apparatus: definition or conceptualisation (cf. strings); measures or key variables (if they are defined according to the INVALSI approach); research design (typology and inclusion of Classic Test Theory or Item Response Theory/Rash Model); participants (10 degree and others); data (significance in relation to INVALSI data).

The selection of the articles identified in the repositories is carried out: selecting and eliminating duplicate articles; making the screening titles and abstracts and consequent exclusion of texts that do not meet the criteria; exporting the references in the EndNote citation manager; by making a full reading of the text: further inclusion from the bibliography and exclusion of texts not meeting the criteria.

The following data will be extracted: author, title and bibliographic references; year of publication; abstract, type of study; study population/sample; analytical data: outcomes, methods and tools, results; study quality (possible bias - p value etc.): adequacy of study design and sample size to address research objectives; generalizability (representativeness of the sample); methods of selecting participants or conditions, response rate and mortality of the sample; measurement of study variables, limit case control, adequacy of statistical analysis, quality of reports, quality of intervention/condition.

Findings or argument. At the time of submission of this abstract, the systematic review of literature is still ongoing. The first results support the decision to carry out this phase of the research because a theoretical framework is being systematically outlined to support the study process conducted in collaboration with INVALSI.



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**Keywords:** Standardized Assessment, Digital Competences of Students, Systematic Literature Review

## The transition of INVALSI primary mathematics tests to CBT: evidence from the literature

Cintia Scafa Urbaz Vilchez

Introduction. In the last decades the main international assessment institutions (OECD, IEA) have shown a growing interest in the utilisation of digital tools for the development of large-scale assessment tests. At first glance, such inclination could be attributed to the pervasiveness of those tools in everyday life and in several socio-economic and cultural context like education, among others. Further important aspects that have led to such interest are intertwined with some advantages associated with the utilisation of digital device for assessment purposes. Differently from the paper-and-pencil testing

(PPT), the administration mode based on computer or on other digital device allows to reduce printing, shipping, and delivery costs of assessment tests [Fishbein et al., 2018; Lynch, 2022; Poggio et al., 2005]. Moreover, since they are available on the internet, these digital devices can rapidly return performance data and provide with functionalities to guarantee the security of tests. In addition, computer-based testing (CBT) permits to introduce new item formats [Sibberns, 2020], which can employ the multimedia resources of the administration digital means. Regardless of the benefits mentioned so far, technology entering the educational assessment scene entails multiple challenges that educational researchers are dealing with through high-stake field trials or data analysis for delving deeper into the effects of such assessment evolution.

In Italy the transition to CBT has become effective in 2018 involving tests meant to only secondary school students, both lower and higher levels, but not for primary ones. Starting from the beginning of the current year, INVALSI has launched an experimental project through which evaluate the feasibility of such transition.

**Research objective.** To realise the transition to CBT in primary school it is necessary to first start from a deep study on the scientific evidence provided by the research literature. In this way we can identify promises and pitfalls of CBT with respect to the conventional PPT and comparative aspects between digital and traditional testing. The main object of this contribution is to provide with a literature review of a set of scientific papers to analyse the experiences of other countries that already performed such transition and to set up an experimental study in our country that emphasises strengths and weaknesses of this transition before it becomes effective in our primary schools. Undoubtedly, the analysis of the research literature allows to obtain useful information to develop such experimental study, like sample selection, suitable research designs, analysis methods, and testing tools. In conclusion, our research describes some of the evidence identified from a set of papers, written by both research entities and assessment institutions, and points out aspects that should be considered in the transition from a conventional testing administration mode to a digital one for the mathematics discipline.

**Methodology.** Throughout the literature review we observed a set of scientific contributions written by both assessment and evaluation institutions (IEA, OECD, etc.) and mathematics education research groups. We have divided the collected articles in two large categories:

1. Research studies on the transition from PPT and CBT related to mathematics and other disciplines.
2. Studies written by national and international institutions concerning the transition to CBT and with or without referring to mathematics content.

**Results.** Since our research goal is the development of the transition to a digital administration mode, to determine the validity of CBT it is necessary that performance data of test, delivered from both PPT and CBT, are equivalent [Ebrahimi et al., 2019; Fishbein et al., 2018; Hamhuis et al., 2020; Jerrim, 2016; Kingston, 2008; Logan, 2015; Piaw, 2012]. In addition, the test should guarantee equity to all students, namely, no one should be disadvantaged by the administration mode [Jerrim, 2016; Lynch, 2022]. In our paper collection we have identified several comparative studies examining, through suitable research methodologies, the emerging differences between the two modes. For instance, in the paper by Poggio and colleagues (2005) the research aim is focused on the detection and deepening of the so-called mode effects, namely the variances mainly related to the administration mode. Mostly of analysed studies use high-stake experimental studies, where researchers administered either two parallel and equated forms of a test in both modes and separated by time [Ebrahimi et al., 2019; Fishbein et al., 2018; Hamhuis et al., 2020; Poggio et al., 2005] or the same form [Piaw, 2012; Singleton, 2001]. Usually, at the end of such experimental studies researchers proposed a questionnaire, mostly paper-based, related to the student experience with digital devices, socio-economic status, and the user-friendliness of the testing platform [Bennett et al., 2008; Fishbein et al., 2018]. Such questionnaire could be useful specifically at analysis stage to better understand if these mode effects have an impact on certain student categories, based on genre, socio-economic status, students' experience with digital devices, ethnicity, and others [Bennett et al., 2008; Hamhuis et al., 2020]. For the two testing forms, administered in both modes, to be comparable, they should be equivalent at psychometric level, namely they both should measure the same constructs although their diverse appearances. The item transposition from a conventional test to

a digital one is not always possible. If the former contains items that cannot be transposed in an equivalent digital form, then it is important to think of which resources of the digital means could be employed to make these items as equivalent as possible.

In this regard, some authors [Bennett et al., 2008; Ebrahimi et al., 2019; Fishbein et al., 2018; Hamhuis et al., 2020; Lynch, 2022; Poggio et al., 2005] explain how the transition of the administration mode can impact on the test validity, by introducing variance from construct other than the one meant to be measured. Regarding mathematics tests, some reviews [Kingston, 2008; Lynch, 2022; Redecker & Johannessen, 2013; Sibberns, 2020] list a set of issues that should be taken into account during the mode transition, since they could produce mode effects, such as item format, navigation test/items, and students' cognitive processes to solve items. Such issues can be intertwined: for example, the possible differences on arithmetic item scores and algebra item ones could be associated with students' cognitive processes. Consequently, such processes could be influenced by the navigation procedure and the item format. Moreover, different studies [Bryant, 2017; Lynch, 2022; Sibberns, 2020] highlight how items requiring drawing a graphic or a geometrical manipulation could be considered as more difficult if solved in a digital device. Based on some research papers [Bennett et al., 2008; Lynch, 2022], tests with different kinds of item formats could impact on the scores, since some formats could advantage certain students' categories rather than others less experienced with digital devices.

**Conclusions.** In general, notwithstanding the presence of conflicting results in the literature, the item format could depend on the administration mode, the experience with digital devices, and the discipline. In conclusion, several literature reviews [Kingston, 2008; Lynch, 2022; Redecker & Johannessen, 2013] show mixed results: in some cases, they reported few improvements on data performance of students who solved computer-based tests, hence, in other cases, the results seem to be better in PPT. In summary, most of the analysed studies do not emphasise relevant differences in the scores of tests administered in both modes so they conclude that CBT can represent a valid alternative to conventional testing. Nonetheless, such studies state that identified differences could not be relevant if the computer-based test version is the static and literal transposition of its original and standardised version.

We will take into consideration all the aspects emerged from the analysis of the research literature for setting up the experimental study and checking the feasibility of the transition of test to digital devices also for the fifth grade of primary school.

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**Keywords:** Large-scale assessment, CBT, Primary school

## **Learning Enhancer tools: a theoretical framework to use artificial intelligence in education and learning applications**

**Angelo Rega - Raffaele Di Fuccio - Rossana Laccone - Alessandro Frolli**

European guidelines for education, "The Digital Education Action Plan 2021-2027", which underline a strategy developed by the European Commission to encourage the use of digital technologies for education, are focused on artificial intelligence and intelligent tutoring systems for education.

The main goal of EU is to exploit the opportunities offered by digitalization to improve digital education and skills of European students.

The plan includes different calls to action and goals - some of which are:

Priority 1: Fostering the development of a high-performing digital education ecosystem.

Priority 2: Enhancing digital skills and competences for the digital transformation.

The plan started in 2018 is expected to develop until 2027.

The European Community's recommendations in 2022 about artificial intelligence and education have become more relevant since the pandemic. In fact, alongside digital transformation, the European Community underlines how important the use of educational digital contents is for both supply (the industry and the public sector) and demand sides (educators and students). In a vast number of European agencies' documents, it has been reported that digital transformation is causing numerous changes: on the one hand, educational digital contents are always more creative, immersive, interactive, and different from one another, on the other hand, thanks to technological progress, the AI is able to develop educational contents, so, there is an exponential increase of educational digital contents development. Besides that, there are some challenges to take into consideration, e.g, digital platforms and their algorithms can be educational digital contents "guardians", causing issues for the use of these resources, or for their quality. In addition to this, it is important to consider that it will be more difficult for students to verify the quality and reliability of digital teaching resources compared to traditional

contents, as well as web's risks related to data protection and privacy. All these topics of global interest require all the experts involved in designing, studying, and developing learning technological solutions to start outlining common, scientifically, and ethically validated methodologies.

Taking into account not only these priorities, but also the large production and the worldwide market of software and technological systems, it is necessary to make a reflection about the use of the artificial intelligence systems. It is important to consider them not only by an ethical point of view, or to consider how they can protect personal data, but it is important to think also about the effect that these tools can have on student learning.

In this work we are going to formalise a theoretical framework to develop hardware and software applications in education based on the use of artificial intelligence.

We explore how they should use adaptive tutoring systems methodology based on artificial agents. The need for this theorization is bringing out from the growing market of applications dedicated to the world of education and oriented to the personalization of student's learning experiences. It will be presented a design scheme of a learning application based on artificial intelligence, which will move from the learning theory of reference to the characteristics of the artificial agent. In addition to the framework definition used to develop these tools, which we will call LET (Learning Enhancer Tools), this work will also describe an artificial agent algorithm in all its individual operating components.

In this paper is also supported the following thesis about LETs (Learning Enhancer Tools): these tools must have characteristics as close as possible to the theories of constructivist and cognitivist developmental psychology, they must be a learning aid, and cognitive abilities intensifiers. They must stay in the student's zone of proximal development in order to be a learning facilitator. Thanks to these, students should be able to develop cognition in an active process of knowledge construction. The just exposed theory describes Learning Enhancer Tools as "learning amplifiers and intensifiers" which can be considered as devices, strategies or methodologies developed to improve effectiveness and efficiency of learning process.

Every LET must support, stimulate, and be a resource for the development of students' competence, knowledge acquisition and improvement in their learning ability.

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**Keywords:** Artificial intelligence, Tutoring systems, Learning enhancement

## **Integration between Artificial Intelligence and math tests: an experimental overview about eighth grade**

**Alessia Cividin**

The integration of Artificial Intelligence (AI) into educational processes represents one of the most significant fronts of innovation in the field of education. In the digital age, AI promises not only to revolutionize the way we teach and learn but also to offer tools for making student assessment more effective, fair, and personalized. Within this context, the INVALSI math tests, a fundamental tool for the standardized assessment of student skills in Italy, emerge as a fertile ground for the application of AI. Through the analysis of vast datasets generated by the assessments, AI can identify patterns and trends, providing valuable insights for improving both teaching and learning.

The goal of this study is twofold: on one hand, to analyze how AI can be integrated into the INVALSI math tests to optimize the assessment process, and on the other, to investigate the impacts of such integration on teaching practices and student success. Starting from the analysis of the INVALSI test results from 2023 and 2024, this work aims to explore the potential of AI not only in the automatic correction of tests but also in identifying students at risk, in personalizing learning, and in designing targeted educational interventions.

Through a thorough review of the literature and the study of concrete cases, we intend to answer fundamental questions about how AI can transform mathematics education, making the INVALSI tests an even more powerful tool for teachers and students. Our work is situated at the intersection of technology and pedagogy, offering a comprehensive look at the future of mathematics education in Italy and beyond.

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The integration of AI's predictive capabilities into the educational setting stands as one of the most promising innovations for mathematics education. Through the analysis of vast datasets, AI holds the potential not only to track students' academic performance but also to identify less tangible factors that influence learning and overall well-being. Variables such as access to adequate educational resources, socio-economic background, and even students' emotional states can be analyzed to understand how these elements interact with learning outcomes. This understanding allows educational institutions to devise and implement targeted policies, capable of precisely meeting each student's needs, thus promoting a more inclusive and personalized approach to education.

A novel aspect of our research explores how AI can be employed to assess student competencies not only through quantitative data analysis but also via natural language interpretation. This latter point proves crucial for a holistic evaluation of students' abilities, as it enables us to move beyond numbers, analyzing expressive complexity, argumentative coherence, and the capability to use mathematical language. Thus, the evaluation of communicative and analytical skills becomes deeper and more articulated, providing a truer representation of a student's actual abilities.

Simultaneously, our study places particular emphasis on students' argumentative competence, deemed essential in mathematics education for developing critical thinking and advanced problem-solving skills. By analyzing the outcomes and responses from the INVALSI test sessions of 2023 and 2024, we aim to evaluate how AI can support the identification and measurement of this competence. The goal is to develop a model that, through the use of diversely structured questions and automated correction, can discern the various levels of argumentative ability, thereby offering detailed and personalized feedback that can guide teachers in identifying the most effective teaching strategies.

The challenge lies in creating systems capable of interpreting the complexity of mathematical discourse, recognizing not only the correctness of the answers but also the relevance and solidity of the argumentation. The adoption of these predictive and interpretative technologies within the scope of the INVALSI tests could revolutionize the way students' competencies are evaluated, shifting the focus from a simple verification of correctness to a more complex and meaningful analysis of mathematical thought. At the core of our research is the ambition to develop and implement a pioneering experiment aimed at creating specific questions for middle school mathematics. These questions, rigorously aligned with existing regulations, are intended to assess various levels of students' argumentative competence, facilitating a didactic pathway that evolves from fundamental concepts towards advanced understanding. We aim to provide educators with an agile and adaptable tool, designed to accurately map students' argumentative skills, offering precise measurement that can guide teaching decisions towards targeted and personalized interventions.

In parallel, the research seeks to deeply explore the methods of evaluating argumentative competence through the use of standardized digital tests, specifically for eighth-grade students. By focusing on the analysis of existing results and currently used evaluative methodologies, we aim to identify the most effective aspects and those susceptible to improvement. This inquiry will allow us to assess the efficiency of current evaluative practices and explore how the introduction of AI can refine and enrich these processes, making the assessment not only more streamlined but also more aligned with educational goals.

Our approach aims to transcend the boundaries of traditional evaluative methodologies, which often rely on tests based on predefined responses or inflexible criteria, incapable of capturing the essence of mathematical reasoning and argumentative capability. By designing questions that stimulate critical reflection and the formulation of coherent and well-structured arguments, we aspire to encourage a more complete and varied cognitive development in students. The experiment we propose represents an important step towards the adoption of assessment tools that not only comply with regulatory requirements but are also capable of effectively meeting the challenges posed by contextualized and in-depth mathematical teaching.

Ultimately, this study aspires to chart new directions in the evaluation of argumentative competencies in the field of mathematics, leveraging the potential of advanced technologies and cutting-edge methods. The ultimate goal is to contribute to the advancement of mathematics education, enhancing the quality of education and equipping students with the necessary skills to successfully navigate the complexities of the discipline.

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## Sitography

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**Keywords:** Artificial intelligence, Natural intelligence, Math

## The "valence" of valential grammar meets INVALSI tests and dresses in digital

**Caterina D'Alessio - Antonietta Cerra - Maria Rosaria Gabola**

The social fabric in which the IC Don Milani Linguisti di Giffoni Valle Piana operates is very diverse: alongside families actively involved in their children's school life, economically and culturally disadvantaged families are characterized by fragile approaches to the educational function they are entrusted with. To respond adequately to these family issues, the school proposes a varied, fair, inclusive, flexible, and articulated educational offer, especially to address the sometimes discouraging results of the INVALSI tests in recent years. In accordance with what UNESCO stated in Goal 4 of the Education 2030 Agenda, our institute adopts the perspective of a learning hub, becoming an integrated, fair, structured educational system in which everyone can feel recognized, welcomed, and valued. Within the framework of the Scuola Viva program this year, a reading and writing workshop on Valential Grammar was proposed for students in grades 2 and 3 of the "Fausto Andria" Primary School, aimed at guiding students through the processes of understanding the valential model through procedural and strategic orientations, meaningful, aggregating, inclusive, innovative learning. The workshop included training paths that, through significant and stimulating experiences, fostered students' motivation for study and personal involvement, encouraging self-assessment and supporting lifelong learning. The chosen working methodology favored cooperative language learning as it promotes positive effects on linguistic skills and a gradual approach to the administration of INVALSI tests by developing reading skills in increasingly complex texts among peers. The valential grammar model allows students to become active protagonists of the learning process: they are not asked to memorize definitions or labels to apply or recognize, but rather to make hypotheses, verify them, draw graphs, and radial diagrams. In fact, the valential grammar model trains the mind in a constant and fruitful exercise of semantic analysis of words; it lends itself to a representation of sentence structures through graphic schemes with a strong visual impact. It enables students to clearly understand linguistic mechanisms and phenomena, acting not on memory but on reasoning and intuition, allowing them to identify relationships between various linguistic elements composing sentences simply by observing the language in use starting from the verb. Empirical research demonstrates how this model engages students in a true reflection on language (cf. National Guidelines), through an inductive and exploratory teaching approach, fostering, at the same time, a growing interest and proactive motivation for studying grammar. The goal of the planned path within the linguistic workshop is to stimulate children to develop noticing skills, focusing on the power of words and the subsequent visualization of "broken" sentences into meaningful segments, refining the deep observation skills of the fundamental language in the linguistic knowledge innovation process. Various learning units were prepared, divided into the following phases and with the following educational purposes:



PHASE 1: INITIATION - to intrigue students by motivating them towards the new path through the creation of a climate of curiosity (playful, cooperative, and participatory mode), sharing a challenging question, and presenting the path in a digital key.

PHASE 2: EXPLORATION/OBSERVATION - to put students in a condition to interact with the knowledge content, observing it, analyzing it, making hypotheses, discussing them until reaching a result considered correct (problem-solving). The class is "immersed" in authentic active teaching through observation and experiential manipulation of content, formulation of hypotheses, and their verification.

PHASE 3: RESTITUTION - to lead the class to reason about the results achieved in the exploratory and knowledge phase, through comparison of errors, shared resolution of the same, and subsequent correct reformulation.

PHASE 4: SYSTEMATIZATION OF LEARNING - to lead the class to reconstruct the process, identify the learning outcome to be fixed/declared in the different chosen forms (storytelling, report, road map, digital elaborations, ...).

PHASE 5: Individual final verification and shared reflection in plenary.

From the results of the INVALSI tests 2022, it emerges that students have fewer difficulties with English than with their mother tongue. This observation motivated the need to use the methodology of the INVALSI model as a guiding principle that accompanied the path in every phase, enabling the customization of learning: from managing programming processes to organizational methods, from improvement actions to the evaluative process in all its phases (entry, in-progress, final). It was decided to promote a metacognitive competency-based teaching centered on the design of cooperative laboratory activities of reflective practices and the management of teaching activities through cooperative learning, learning by doing, group work, peer education which, on one hand, allowed students to work together to achieve a common goal, to learn through "doing", to develop life skills, i.e., those everyday life skills necessary "to feel well", on the other hand, it allowed teachers to carry out targeted and personalized interventions for those showing difficulties. The INVALSI tests, as the glue of the valential grammar path, became a pedagogical-didactic innovation tool that accompanied every step of the path: from entry tests, administered and corrected through the identification in plenary of cooperative roles within each team (reader, detective, test compiler, outcome recorder, debate moderator, digital organizer), to the use of tests in every presented learning unit, up to the administration of the final verification test. The transversal analysis of the INVALSI tests proposed in the initial phase, meticulously depicted in easily interpretable graphs, allowed the teaching team to receive detailed feedback on the items in which students encountered the greatest difficulties and those instead reported by the students themselves regarding comprehension difficulties of various kinds in order to have an overview of the problematic areas from which to start for the remodulation of the project framework. This moment represented an initial evaluative phase of the path: starting from an external evaluation tool (the INVALSI test), the teachers were able to prepare a corresponding evaluation with the internal evaluative framework expressed in tenths in order to remodulate the learning units to be more responsive to the recorded outcomes in terms of skills to promote and authentic tasks to plan. Regarding the difficulties encountered by students in understanding the questions, teachers focused on metacognitive reflection on the reasoning modes highlighted by the students. This stimulated students' awareness of learning modes in order to enhance their effectiveness, reflecting on the modes and quality of their own responses. This approach allowed our students to become more familiar and constructively engage with the INVALSI tests, learning to understand them by analyzing strengths and weaknesses and experiencing them with hoped-for serenity. The active and conscious use of technology within the planned path allowed the experimentation of new methods and new contexts for reflection, cooperation, and creativity development adapting to the needs of the network society. Computer programming was promoted in a playful context: by playing and having fun, students acquired new skills related to the use of presentation software, digital platforms, and free web apps. Multiple digital contents were created by students, and various software were experimented with for their realization: biteable, prezi, genially, podcast, wakelet, canva, all easily usable, especially in the flipped classroom teaching approach. In conclusion, the presented path highlighted that the co-construction of a reformulated and remodeled path based on feedback from the INVALSI tests proposed in the various procedural phases, the digital approach characterizing each UDA, and the representation in multiple forms of organizational learning underlying the evaluative process give new life and new

vitality to the INVALSI tests, which become instrumental for improving transversal skills, allowing students to view mistakes as opportunities and shared values.

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**Keywords:** Inclusive fair self-assessment

# SESSION 7. THE USE OF INVALSI DATA AND MATERIALS IN TEACHING – MATH 1

ORGANIZER: INVALSI

COORDINATOR: PAOLA GIANGIACOMO

DISCUSSANT: FEDERICA FERRETTI

18 OCTOBER: 4.30 - 6.30 PM {ROOM 2 – TEACHING 7}

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## Using INVALSI Math Test Questions for Improving Learning

Stefania Pozio

Introduction. Since the transition to computer-based testing (or CBT) in middle and high school, there is a feeling among teachers of a kind of resignation to the national surveys, as if they feel they have been deprived of something important: the chance to see which questions their students were able to measure themselves against and which they had the most difficulty with. In fact, the move to CBT allowed for a timelier description of each student's skill level in terms of what they can do in each content area, and that was not possible if there was paper-based testing. Thus, the transition to CBT testing has brought an advantage in terms of being able to identify a link between student ability (shown in the test) and types of tasks required. Nevertheless, there remains the problem of bringing teachers closer to the INVALSI tests of G8.

The purpose of this paper is to present a proposal that would allow teachers to continue to monitor the difficulties their students find when they must solve an INVALSI math question, even with the prospect of using such tests from a formative perspective (Pozio & Botta, 2018).

Purpose and Objectives of the Research. This contribution stems from a series of reflections that arise as teachers' disappointment is perceived in not being able to know the questions that G8 students face in the national test and thus in no longer seeing their students' errors. In fact, teachers should keep in mind that when the tests were paper-based, they were administered at the end of the school year (at the end of June, during the State Examination) and that their students' errors were recorded only at the time of correction because such errors were unlikely to be analyzed in September, since there would no longer be an opportunity to work on the errors with the students. In addition, the errors were related only to specific questions, which in turn related only to certain topics, so there was only a limited view of the students' difficulties.

The goal is to suggest to teachers, who are interested in learning about their students' errors to INVALSI questions, to introduce these questions into daily teaching. The questions are available on the various official sites or associated sites (INVALSI.it site, INVALSIopen site, gestinv site, etc.). While a particular topic is being addressed, it would be appropriate to use several INVALSI questions related to that topic. The purpose of using these questions is to check whether students, faced with questions not prepared by the teacher and certainly different from those generally found in textbooks, are able to answer them correctly and thus demonstrate that they have thoroughly understood the topic. For example, imagine that a teacher is working with the class on the properties of powers. Instead of waiting until the end of the year and the G8 national test to see how students would answer the one question that may be on the test, one can find all the questions on the properties of powers that INVALSI has prepared over the years, submit them to students, analyze their errors and discuss them with them.

Methodology. In order to ensure that the use of INVALSI questions in daily teaching can have formative value, it is necessary to go beyond simply administering batteries of questions, e.g., a whole booklet, and returning students a simple score based on the number of correct answers. Individual questions submitted to students can, of course, be modified, e.g., to a multiple-choice question can be added a request to explain the process that led to choosing a particular answer choice.

What is important is that the questions chosen, and even more so the related student responses, are analyzed and discussed with the students themselves to provide them with *feedback* that goes into formative assessment. The review of errors can be shared with the entire class group, or activities involving peer *feedback* in small groups can be proposed. In other cases, *feedback* may even be individual and accompanied by the proposal of specific remedial activities for each student. In general, it should be

kept in mind that *feedback* is more effective if the tasks proposed to the student are expanded so that he or she can gain a deeper awareness of the learning objective to be achieved (Chappius S. & Chappius J., 2008).

In order that the use of INVALSI questions has true formative value, it is necessary that the results of the analysis of the answers be shared systematically with the class so that each student has the opportunity to process the experience constituted by the performance of the test and to analyze the results, appropriately guided in his or her journey by the teacher, until he or she comes to recognize the obstacles he or she has had to face and the new learning he or she has been able to construct. In fact, the student is able to fully understand a given topic only if he becomes aware of the misconception or gap that led him to make a mistake related to the topic itself. As Zan (2007) claims, it is from error that much of learning originates, especially in mathematics. It is always important to recognize error as an opportunity for learning for everyone (those who made it, those who did not make it, and the teacher). On the other hand, the acceptance of errors as essential sources of adjustment and advancement (Astolfi, 1997) is realized only on the condition that they are analyzed and understood, preferably in a diverse situation, because not everyone will have encountered the same obstacles.

Results. The administration of several questions taken from the INVALSI tests, all related to a topic being dealt with in class, allows, by analyzing the results, to identify specific areas of intervention if these are analyzed in relation to the activities carried out in class and the learning objectives set by the teacher. In addition, discussion with students regarding their mistakes may not only be useful to the students themselves in consolidating their knowledge and skills on the topic under consideration, but also allow teachers to understand what did not work in their teaching action and how they can reshape it. In addition to this, a careful reading of the written answers given by the students to the open-ended questions and an analysis of the options chosen in the multiple-choice questions will enable them to identify recurring errors, widespread misconceptions, and erroneous procedures.

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**Keywords:** Math tests, Formative assessment, CBT tests

## Learning and assessing mathematical proficiency in the Space and figures domain

Francesca Ferrara - Ketty Savioli - Stefania Pozio

Introduction. The field trial of the last national assessment of mathematics at grade 2 and especially grade 5 (carried out in May of the previous year) revealed a very interesting and unexpected aspect: a widespread complexity associated to mathematics items in the *Space and Figures* (SF) domain.

In fact, for many of the SF items the field trial showed relatively low percentages of correct answers, in several cases so low that they could not be considered as possible candidates to be part of the national assessment test. In short, they are items that are too difficult and, as a consequence, become insignificant for the purpose of constructing a statistically balanced test.

This contribution focuses precisely on the data provided by the 2023 field trial, particularly at grade 5, to expand to a vision of formative assessment as assessment for learning.

Our aim is to discuss these data in the light not only of psychometric analyses of the field trial items but also of a qualitative analysis of the answers given to some of such items by children in fifth-grade elementary school classes. The purpose of this analysis was to investigate and understand the reasons

for the complexity of the items, the factors that may have accounted for the high percentages of incorrect (and possibly missing) answers, and the extent to which these factors are secondary to the mathematical proficiency being assessed. The conclusions we will draw are derived exactly from such work.

*Research object and hypothesis.* In the perspective outlined above, we examine here a set of grade 5 questions from the SF domain, which were part of the field trial of this year's national assessment of mathematics, and the geometric proficiency they aim to assess.

One of the complexities of geometric thinking is the involvement of objects with a dual nature, so-called figural concepts (Fishbein, 1993). In short, we are dealing with objects that are both conceptual and figural in nature: in addition to spatial properties (shape, size, position) they possess conceptual qualities (abstractness, ideality, generality). The conceptual component refers to the set of objects' common properties and relations that are the result of abstraction. The figural component, on the other hand, makes use of images as sensible means to talk about objects, reflecting their origin from real space. Thus, for example, a triangle is an ideal entity that can be formally determined, but in reality, the absolute perfection of a triangle cannot be found. The image component stimulates new directions of thinking, but this process is strongly controlled by logical and conceptual constraints.

Briefly speaking, in teaching geometry (thus, in building geometric proficiency), harmonization of the two aspects is crucial. In the absence of such harmonization, the figural part runs the risk of being identified with the conceptual part, overpowering it: so, for example, an isosceles triangle drawn with a horizontal base becomes "all triangles" or "the triangle", or the height of a triangle is conceived as an always vertical segment (misconceptions well known from the literature). In light of these considerations, the learning of geometric concepts cannot be only procedural (i.e., based on the mere application of formulas, rules and procedures) but this must also be interwoven with conceptual learning (e.g., Sfard, 1991; Arcavi, 1994), more aimed at understanding and building proficiency in geometry.

*Used data.* The data we analyze are of two kinds: on the one hand, information returned by statistical analyses of the field trial results regarding several grade 5 SF items that were particularly difficult. On the other hand, processes of solving some of these items by children in two grade 5 classrooms, which highlight errors often related to calculation rather than to actual geometric proficiency (for which we take the *National Guidelines* for the first cycle curriculum as a reference). The items we focus on aim to assess different aspects of geometric proficiency and thus allow a broad look at it.

*Method.* For each of the *Space and figures* items from the 2023 grade 5 field trial considered in this paper, we analyze in particular the percentages of incorrect and missing answers and the behavior of the item: how difficult it is, how discriminative it is, and its characteristic curve, which allows us to understand the relationship between the probability of correct answer and the ability shown in the field trial. As for the material collected in the grade 5 classrooms (written protocols), we analyze the answers given to several questions by students accustomed to laboratory and not purely procedural teaching. The protocols reveal numerous errors related to calculation rather than to the proficiency assessed by the questions.

*Results.* With the above analysis, we can point out that incorrect answers are often accompanied by correct solving strategies, hinting at calculation error as the main source of a low success rate. This brings our attention back to the essential elements to be considered in the design and construction of items for the assessment of geometric proficiency assessment (an assessment that can be thought of both as internal, within the individual classroom, and as external, across the country). Depending on the purpose of the item and the associated proficiency goal, it is especially necessary to avoid having the data provided, numerical or otherwise, pollute the solving process (e.g., because the order of magnitude of the result of the operation used is not checked; or, because perceptual factors influence the visible properties of a geometric figure), especially when the proficiency being assessed concerns the dimensions of problem solving and argumentation, not the accuracy of a calculation.

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**Keywords:** Mathematics, Geometric proficiency, Figural concepts, Errors, Assessment for Learning

## Response omissions in TIMSS tests: a comparison of paper and digital

Clelia Cascella- Francesco Annunziata - Laura Palmerio

Introduction. Students' solving strategies and their likelihood of success on a given item is contingent upon several factors (Son & Watanabe, 2017). Among these, the medium, i.e. how an assessment test is administered to students, can play an important role (e.g., Gu, Drake & Wolfe, 2006).

In the present study, after a systematic literature review of studies aimed at comparing the differences between computer- and paper-based assessment, we focused on the omitted responses to the mathematics items in the TIMSS (Trends in International Mathematics and Science Study) 2019 international survey, at grade 8.

The TIMSS survey, sponsored by the International Educational Association (IEA), aims to measure students' learning in Mathematics and Science at grades 4 and 8. Its four-yearly frequency, with Italy participating from the first cycle (1995), makes it possible to show the evolution of the results of the same cohort of students from grade 4 to grade 8.

TIMSS includes items designed to assess three cognitive domains: 'knowledge' (referring to the facts, concepts and procedures that students need to know), 'application' (referring to students' ability to use knowledge and conceptual understanding to solve problems or answer questions) and 'reasoning' (referring to students' ability to go beyond routine problem solving to operate in unfamiliar situations, complex contexts and multi-step problems).

TIMSS 2019 marked the introduction of a computerised administration system. More than half of the participating countries, including Italy, adopted a partly paper-based and partly computer-based (Computer-Based Assessment, CBA), while the other countries continued only with the paper-based mode (Paper-Based Assessment, PBA)<sup>1</sup>. The results from all participating countries were compared and reported on a common psychometric scale, regardless of the mode of administration (Martin, von Davier, & Mullis, 2020).

Subject, objectives and hypothesis. In the present study, we focused on the analysis of omitted responses to mathematics items. Using data collected in TIMSS 2019 for Grade 8 students, we examined the differences between students' responses to the same mathematics items in both the paper and computer versions (PBA and CBA, respectively). We focused on the open-ended items that tend to have a higher number of omitted answers.

Our preliminary data analysis showed that:

- the difference between omitted answers in cognitive tests administered in PBA and those administered in CBA is usually small, less than 5%;
- the items with a larger difference (10% or more) in omitted values between PBA and CBA belong mainly to two cognitive domains, namely 'reasoning' and 'application';
- students are more likely to respond to a mathematics item administered in the CBA mode than to the same item administered in the PBA mode.

Data. The TIMSS 2019 eighth grade sample consists of 158 schools with a total of 3,619 students. The average mathematics score for this grade is 497 points, which is in line with the international average (500 points). The four content areas assessed in TIMSS are Number, Algebra, Geometry, Data and Probability.

In the 2019 edition, Italy's results showed a shortfall among students in Algebra, while in Geometry the results were more than positive. Finally, in the domains of number and data and probability, no significant differences were found compared to the main scale. In terms of students' personal characteristics, the data from 26 countries showed no statistically significant gender differences. On the contrary, in Italy, males showed significantly higher performance than females (Palmerio, Caponera, 2021).

Method. The data analysis was divided into two stages. In the first (exploratory phase), the response rates (correct, incorrect and missing) provided by the students in the tests administered in the CBA and PBA were compared. In the second, the TIMSS data are analysed using a multilevel regression model (Hox, 2010), which is able to take into account the hierarchical structure of the sample (students within classrooms and within schools) and aims to explore the intersectionality between students' personal characteristics and the way in which the test is administered.

The representativeness of the sample at class level (Martin et al., 2020, p.131), as well as at school level, makes it possible to investigate, albeit indirectly, the possible relationship between the student's response and the teaching practices implemented in the class, especially with regard to the "knowledge" items, since the responses to the "reasoning" and "application" items also refer, to varying degrees, to each student's ability to use logical and systematic thinking, including intuitive and inductive reasoning. In particular, the 'reasoning' items - those for which we observed a greater difference in the percentage of omitted answers between PBA and CBA - involve intuitive and inductive reasoning based on patterns and regularities that can be used to find solutions to problems posed in unfamiliar situations. Such problems may be purely mathematical or set in a real-life context.

Previous studies have shown that personal characteristics of students, such as gender, play a 'moderating' role in such relationships (e.g. Ethington, 1990; Hyde, Fennema & Lamon, 1990; Else-Quest, Hyde, & Linn, 2010; Leder, 2019). In light of these studies, it has been hypothesised that women are less likely than men to answer open-ended questions that are not directly related to teaching practice. The aim of our study is therefore to test this hypothesis by investigating whether and to what extent the mode of administration used, i.e. PBA or CBA mode, may influence the association between students' gender and the number of omitted responses to mathematics items.

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**Keywords:** TIMSS, Mathematics, Response omissions, CBA, PBA, Gender

## **An analysis of problem-solving strategies through the questions of the INVALSI tests**

**Francesca Mariuzzo - Marco Bardelli**

Introduction. In mathematics teaching, one of the most widespread practices is the solution of story problems where students have difficulties such as: the lack of control over the solving processes, the reasonableness of the answers or the understanding of the requests (Zan, 2016). In some cases there is a sort of dissociation from reality with a fracture between the way in which the student deals with real problems and scholastic ones (D'Amore, 2011). These apparently irrational behaviors have stimulated educational research which has highlighted the role of two elements that interact with each other: the stereotyped typology of problems, used in most textbooks, and the ways in which the teacher manages the problem solving, i.e. the implicit and explicit norms that regulate problem solving activities (Brousseau, 1986; D'Amore and Martini, 1997). When students face problems different from those usually present in textbooks, such as some proposed in the INVALSI tests, obstacles to resolution may arise as the fundamental metacognitive aspects for solving problems in a controlled way are not activated through the practices normally expected in the classroom (Schoenfeld, 1985), or they can become an opportunity to encourage an approach that better activates metacognitive processes in problem solving. The processes involved in problem solving strategies were distinguished by Schoenfeld (1985) into the following phases: reading the text of the problem, analysis of the questions, exploration of essential and superfluous data, planning of a possible solution method and strategies to be used, the implementation of calculations and strategies, process verification, control and evaluation implemented during the resolution process. Enhancing solution processes through the proposal of problems that require the mobilization of non-standardized resolution strategies allows us to activate mathematical metacognition and to reason about errors in such a way as to allow teachers to better understand students' thinking (Sbaragli, 2012; Schoenfeld, 2013).

Object, aims and research hypotheses. The object of the investigation was the phases of problem-solving strategies (Schoenfeld, 1985), taken from the INVALSI questions, implemented by fifth-grade students and the influence that the didactic contract can have on them (Brousseau, 1986). To focus the investigation within a significant domain in the field of mathematics teaching, the strategies investigated were those relating to the solution of problems where fractions were present in the different meanings that they have: ratios, percentages, probabilities, part of a whole (Pinilla, 2005). We thus attempted to study the relationship between solution strategies and didactic contracts in problems that were not similar to those present in textbooks or in the materials most commonly used for primary school and also available online, to understand how the strategies were organized by students as the type of problems proposed varies. The hypothesis investigated concerns how students' solution strategies can change as the type of problems faced in relation to a given mathematical content varies.

Data and method. The survey was carried out in a primary school of the "E. Mattei", from the province of Venice. The subjects of the investigation were 26 students from two fifth grade classes. The experimentation, with related data collection, took place on three consecutive days during the second quarter.

The investigation was conducted in three phases. The first was an individual test made up of six problems, identified by the INVALSI tests of the 2015, 2016 and 2021 school years, through the use of the GESTINV platform, on fractions understood as: ratios, percentages and probabilities. Furthermore, an initial question was added to acquire information on which steps students normally take to solve a



problem and some final questions (items) to obtain explanations on the strategies used to find the answer and carry out calculations and procedures.

The second phase consists of self-reflection through a personal metacognitive questionnaire with ten questions, seven of which are connected to the episodes theorized by the mathematician Schoenfeld (1985) on metacognitive reasoning and three more personal ones regarding the interests and emotions felt while carrying out the questions. This phase made it possible to analyze the ways in which the answers were obtained in the first test and allowed the creation of the groups of students interviewed in the subsequent phase. The questions asked related to reading the text (how many times?), the clarity of the questions, the difficulty in identifying the data, the production of solution schemes, the methods of carrying out the calculations and checking the answer given.

The interviews conducted in the third phase allowed the students to discuss, out loud, the reasoning implemented, analyzing the difficulties encountered and identifying any errors. Student groups were formed based on similar answers provided in the questionnaire.

Results. The students did not have any particular difficulties in solving the Invalsi questions, the correct answers were always over 80%. To the initial question «What are the steps you take when you have to solve a problem?» 17 out of 26 students answer that they are the following: identification of data, question, calculations, answer. This number drops to 11 after carrying out the six Invalsi questions and from the interviews it emerges that for some students reading and understanding the text of the problem are important factors as is the possibility of solving problems correctly even through methods that do not strictly follow those learned at school. The interviews also allowed us to highlight some mathematical misconceptions present in the students, who had demonstrated some deficiencies in justifying their reasoning but who had answered the questions correctly.

The analysis of the metacognitive questionnaires and interviews highlighted the following aspects. Although 24 students read the problem at least 3 times if not more, the errors are almost all attributable to selective reading in which deficiencies in the level of understanding of the text or inattention emerge. Only 8% of the students had difficulty finding the data and none of the students considered developing a solution scheme or a list of steps. This may be due to the ease of the problems or the fact that students do not use them as a method of doing the problems and also, contrary to usual class practice, the calculations by 8 students were done only in their heads. Only just over half of the students reread the answers to the problems and check the calculations. This data is in agreement with what several students declared that they sometimes provide answers immediately or even randomly. The interaction generated between students in small groups by the interviews also allowed a comparison between different solution strategies and therefore an initial consolidation of the idea that different strategies can lead to the same solution albeit with different efficiency.

Finally, with respect to the Didactic Contract, it emerged, especially from the interviews, that in this type of problem the students feel a sense of greater freedom in their thinking, in their decisions on which calculations to carry out and in setting up the solution path.

The questions taken from the existing tests made it possible to highlight how the students' solution strategies depend on the type of problems to be solved and their difficulty. An important factor for the activation of metacognitive reasoning is the request for justification which, although not present in the INVALSI questions, can be added and constitute a tool for in-depth analysis of the students' mathematical conceptions and their problem-solving methods as well as a way of activate metacognitive processes.

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**Keywords:** Didactical contract, INVALSI, Mathematics, Metacognition, Problem solving

## **INVALSI tests: a diagnostic tool for evaluating the success of Game-Based strategy in dyscalculic students**

**Sara Vergallo - Ottavio Giulio Rizzo**

Introduction. Literature provides evidence about the usefulness of using INVALSI data as a tool for evaluating the effectiveness of mathematics tutoring programs for high school students (Berti et al., 2016), and also the use of PISA data to evaluate the effectiveness of a cooperative learning program in mathematics for middle school students (Crippa et al., 2018). In our research, we therefore wanted to investigate, through the administration of some questions selected from the INVALSI mathematics tests of the past years, the effectiveness of an educational intervention based on Game-Based Learning. The subjects were two 11-year-old girls attending the first grade of middle school and a 12-year-old boy attending the second grade of high school, all of them with a previous diagnosis of dyscalculia, in comorbidity with other specific learning disorders. The study participants all come from an affluent socio-economic background.

Research Object and Hypothesis. The research hypothesis was to evaluate whether it was possible to use INVALSI tests as a diagnostic tool, pre- and post-educational intervention, to assay a potential improvement in the mathematical ability of dyscalculic students, in terms of improved performance on INVALSI tests. The intervention was carried out as part of an afternoon tutoring session, specifically for students with SLD, on a one-to-one basis, in sessions lasting 50 minutes. The use of INVALSI tests both before and after the didactic intervention is therefore aimed at the possibility of hypothesizing (or not), tangible improvements in the area of number system or the calculation system (e.g., the recovery of arithmetic facts, the maintenance and recovery of procedures, the application of procedures) and a reduction of errors in the processes necessary for the development of numerical intelligence (counting, mental calculation and written calculation), as well as a reduction of the latency time of responses. The aim of the research will also be to analyze the data to identify recurring themes and errors.

Data. The questions we selected, selected among those with strictly monotonic characteristic curve – and therefore discriminant – based on difficulty and topics to be evaluated, were five Grade V and five Grade II questions, chosen from the 2014, 2015, 2018 and 2019 tests.

Brief summary of the diagnostic situation of the subjects:

- Subject 1: Adequate cognitive functioning that allows her to have good reasoning skills when adequately supported and helped to find the right strategies to deal with her specific difficulties. The situation described outlines the presence of Dysgraphia and Dyscalculia.
- Subject 2: The ability to use numbers and basic numerical concepts and to perform numerical reasoning was reported to be at the lower limit of the average. The same applies to the ability of focused attention for arithmetic reasoning.
- Subject 3: presence of a Writing Disorder with graphical stroke impairment (ICD-10 code F81.1) associated with fragility in reading correctness, comprehension of written text and deficits in the

area of number sense in a child with cognitive functioning in the normal range and behavioral inhibition.

Method. Because of the small number of subjects we worked with, the analysis is intended to be statistically invalid, so we chose to conduct research at a qualitative rather. Most of our work was aimed at analyzing and interpreting the reasoning carried out by the participants during the performance of the test, understanding the cognitive processes underlying their performance, and exploring their problem-solving strategies and ways of thinking. We required subjects to expose aloud their reasoning, the difficulties they encountered, and their impressions of the task performed, using the "thinking aloud" method to collect and record verbal data in real time. The tests were conducted independently, without help or feedback, and the subjects were not shown the test correction after the first administration. As recording tools, we used a voice recorder and a video recording that excluded the filming of the children's faces, focusing on their manual activities.

Reflections on the chosen questions:

- One of the grade V questions has a geometric component on which no reinforcement work was done and can therefore be considered as a control exercise. Indeed, we will see that the answers to this question, unlike those related to the topics on which the interventions focused, did not see any improvement, not even at the level of reasoning or ability to understand the question correctly.
- Grade II questions were included to ensure that the subjects' abilities were suitable for the performance of Grade V questions because, according to ICD-10 (International Statistical Classification of Diseases and Related Health Problems), in order for dyscalculia to be diagnosed, results in accuracy and speed on standardized tests submitted to students must be significantly lower (two standard deviations) than expected for age, class attended and intellectual level.

The activities were developed ad hoc for the project and focus on arithmetic skills. They focused on:

- Multiples and divisors, multiples tables, divisibility criteria chosen to essay the possibility of going to improve, in the 11-12 age group, memorization, retrieval time and awareness of math facts. The game we chose to improve these skills was a modified version, created by us, of the famous game of "guess who," renamed "guess the number." Similarly to the original version of the game, the objective of the game is to ask appropriate questions to the playing partner so that, through answers and by elimination, they can identify the number they have drawn.
- Number line topic chosen after reading several articles about the analysis of the statistical results of the INVALSI tests from which, among other things, a widespread difficulty in the representation and manipulation of the number line emerged (Maffia, 2015). Looking at the ministerial indications about the goals for the development of competencies to be achieved at the end of secondary school, it can be seen that the knowledge and correct use of the number straight line are summarized by the phrase "representing the known numbers on the straight line." Adding importance to the issue of the number line is the fact that it has been included, by Law No. 170/2010, among the compensatory tools available to DSA students, described as "didactic and technological tools that replace or facilitate the performance required in the deficit ability." These tools are intended to compensate the deficit activity, trying to smooth out the difficulties of individuals and make the demand homogeneous for the entire class group.

The activity chosen, in this case, was a version we modified of the traditional "goose game". In this shortened and simplified version of the game is required to move back and forth across the board, becoming informally and unconsciously comfortable with the algebraic sum. During the game we are invited, through directions given on the boxes, to perform calculations to reach other boxes on the board, successive or antecedent.

Results. Grade II questions were found to be easy to solve for all subjects and were answered correctly and easily, pre and post intervention. Regarding Grade V questions, the following improvements, understood as a change from an incorrect answer in the first test to a correct one in the second test, can be seen:

- Subject 1 went from 6 correct answers to 13, considered out of a total of 18 subitems, since four out of 10 questions consisted of more than one prompt. No answer was given correct the first time and incorrect the second time. The questions in which performance improved are as follows: Mat - SNV 2018 05 33 - 0, Mat - SNV 2016 05 30 - 0, Mat - SNV 2018 05 30 - 0, Mat - SNV 2018 02 15 - 0

- Subject 2 went from 10 correct answers to 16. The queries in which performance improved are Mat - SNV 2018 05 33 - 0, Mat - SNV 2016 05 30 - 0, (in which she went from four incorrect items entered to four correct items entered), and Mat - SNV 2018 05 30 - 0 in which, for the last query, she went from a correct answer given the first time to an incorrect one given the second time. Regarding the geometric control question, the subject gave a correct answer during the first administration, but it became an incorrect answer the second time.
- Subject 3, the only one who was 1:2 years old and in seventh grade, went from 14 correct answers to 15, so the improvement in this case is not appreciable. The only difference between the two tests concerns a grade V prompt.

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**Keywords:** Dyscalculia, Play, Mathematics education

# **SESSION 8. SCHOOL AS A LEARNING ORGANIZATION AND THE HEURISTIC VALUE OF INVALSI DATA IN DECISION-MAKING PROCESSES**

**ORGANIZER: INVALSI**

**COORDINATOR: SARA MORI**

**DISCUSSANT: DONATELLA POLIANDRI**

**18 OCTOBER: 4.30 PM - 6.30 PM {ROOM 3 – TEACHING 8}**

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## **A learning school**

**Francesco Mammarella - Roberta Franchi - Ester Valloreo - Carla Lavista**

Introduction. The proposal is part of the self-evaluation process, school year 2022/2025, of the Omnicomprehensive Institute of Città Sant'Angelo, in the province of Pescara, starting from the analysis of the Invalsi data returned with the fragility indices in the 2021/2022 school year and in their intersection with the 2022/2022 training offer plan 2022/2025. A more and more conscious, shared use of data and teaching choices by the teachers of the Institute's primary and secondary schools. The study, starting from the INVALSI data relating to the first classes of the lower secondary school in the year 2021/2022 (current third year), the second classes of high school in 2020/21 and 2021/2022, pays attention to the results of the students, crosses a research path – formation of the test data with the data from the editions of the National Recovery and Resilience Plan (PNRR), and in particular with the investment section 1.4 "Extraordinary intervention aimed at reducing territorial gaps in lower and upper secondary schools and to contrast school dropout". Secondary schools have the possibility of planning extraordinary interventions aimed at reducing territorial gaps and contrasting school dropout. At the end of the 2023/2024 term, the students involved in the actions of 2023/2024 PNRR have already been compared with the results they achieved in the national tests, the 2021/2022 school results, the data of the school psychologist who has been working in the school since 2021/2022 school year. The tools implemented, the summaries developed for the teachers' board, highlight the ways in which the planning, management and evaluation processes were activated by teachers from primary to secondary school. The data collected facilitate the reading and understanding of the critical elements with respect to the actions implemented as organizational, management and teaching practices in the second three-year period, of the school year 2022/2025, of the current management. The processes are monitored, tabulated and analyzed, from October 2022 to May 2025, through a heuristic process that places pupils' learning at the center but also the biases of teachers, students and families, and the various stakeholders. In this approach, cognitive biases and heuristics emerge in their essence as constructs based on ideologies and prejudices that allow decisions to be made but which can lead to error.

Research Object and Hypothesis. The object of the research is represented by the process of identifying and sharing management, organizational, planning, teaching and evaluation choices in order to guarantee coherence and continuity to the priorities and goals of the RAV and the Improvement Plan and of the research - training path with Indire for the two-year path (2022/2024) on shared leadership. In a more specific vision, which includes the actions of the recovery and resilience plan, starting from the contrast of the early school leaving, there is a strong need for clarity of the links between organizational, management and planning objectives and objectives relating to assessment "for learning" and "of learning". Equally evident is the need to strengthen the communication processes between the various protagonists involved to support the sharing and also the genesis of knowledge, culture and skills that are valuable for the development of the school reputation and vision. In this contribution we try to show how the learning generated by the school, with the Educating Community, to operate as a learning community, is itself a function of the ways in which the governance system is organized and implemented.

The data used during the analysis were: 1) the results of the 2021/2022 Invalsi surveys of the current third classes of lower secondary school, of the current fourth and fifth classes of high school, also to understand how the data were understood and implemented by the teachers and students for good

practices and improvement processes; 2) the evaluations of individual students expressed by the teachers of the current classes in the first and second term of the current year; 3) data relating to the 2022/2024 psychological help desk; 4) data relating to the research path - training on Shared Leadership; 5) the use of tools for PNRR Projects -dispersion, STEM (Science, Technology, Engineering and Mathematics), digital transition - for the subsequent reading of the return data, to understand them better and know how to contextualize them in an authentic way as a basis for teachers' planning, for an integrated evaluation between formative, summative and authentic assessment implemented by the school.

Method. The method favors the approach of critical reading of national test data and scholastic results to implement awareness of the interdependence between learning results, learning context, management, organizational and teaching choices in the training and development processes of teachers, times and methods for the evaluation and certification of results in terms of authentic and generative skills. In the current year, the curriculum was integrated with the actions of the PNRR which allowed:

1. Mentoring and orientation paths
2. Paths for strengthening basic skills
3. Paths for family involvement
4. Co-curricular training courses and workshops

The choices made have started a circular learning/teaching method which has enlivened didactic and organizational autonomy, flexibility and personalization, the protagonism of the students who have expressed their choices on some learning to be achieved, the assertiveness of groups of teachers who planned the overall activities, deciding the types in which to invest, the format and the number of hours of each path, in compliance with the minimum standards required by the PNRR.

The method analyzes concern some particular reflections:

- in the sharing of processes and syntheses we underlined the theoretical approach of the double process of Kahneman and Twersky<sup>5</sup>; two processes would intervene in every decision or judgment: the intuitive system (system 1) in proposing the solution and the judgment system (system 2) in controlling it: errors would be explained as failures to control the second system.
- "Systems thinking" identifies the real focus of the management system in human relations and learning precisely in order to integrate all the components of the system and map the relationships on which this system is based in order to contribute and fuel paths of change, through formal and informal control tools that are able to impact both at the strategic and operational levels, providing correct monitoring tools that allow, for a more rational interpretation of the cause and effect, relationships between management decisions, organizational actions and improvement of learning, shared leadership.

Results. From the analysis of the data and their periodic sharing, it emerges how important is the adoption of conscious attitudes towards the educational function that the return Invalsi data have for teachers.

Heuristic processes represent the framework within which to act to raise the levels of competence of the students of our Institute. The re-modulation of class and Institute educational planning alone is not enough, it is not sufficient if it is not accompanied by the analysis of the system, of the methods of choices and of the systemic micro, medium and macro involvement of the individual protagonists and of the socio-cultural context in which it operates through clear communication, open to listening also through the editorial staff of the young high school students of the monthly newspaper L'Angolino.

Another important result is the effort we have made to build functional tools to be able to read the data returned by Invalsi more effectively, to monitor school results, to verify the actions of the PNRR projects, to understand that cognitive learning is strengthened if connected to what is also investigated in the international survey International Civic and Citizenship Education Study ( ICCS) of the IEA - International Association for the Evaluation of Educational Achievement presented in November 2023 by the INVALSI Research Institute.

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<sup>5</sup> [https://moodle2.units.it/pluginfile.php/590922/mod\\_resource/content/0/PENS%2023-24%20lez%2023-24-25.pdf](https://moodle2.units.it/pluginfile.php/590922/mod_resource/content/0/PENS%2023-24%20lez%2023-24-25.pdf)

The school newspaper L'ANGOLINO documents and publishes the results of a series of contents of teaching civic and citizenship education, in addition to the teachers' experiences, the teaching practices, environmental contexts, school climate, the contribution of the family and local community.

This is our horizon of meaning towards the implementation of the logic of improving all those variables on which we can act, understanding their nature and the impact of the shared governance of our institute. And, as desired by the Second Document of the UNESCO organization "Re-imagining our futures together: a new social contract for education", to guide the public debate on the transformation of education it is necessary ask ourselves three fundamental questions: What should we continue to do? What should we abandon? What needs to be creatively invented from scratch?<sup>6</sup>

**Keywords:** Governance, School improvement, Learning, Heuristic search

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## **Schools and territory: a data analysis experience for the definition of common strategic policies**

**Cristina Cosci - Simone Mancini**

Introduction. The project is based on the belief that networking between schools and the school-territory alliance are fundamental levers for the success of school and training students. It is not by chance that among the key guidelines for NRPV interventions linked to the investment 1.4 are, for the fight against early school leaving, the "Network experiences", the initiatives of "Educating Community, co-design and involvement of families and the territory", the "Integration between school and out-of-school". In this direction goes the path that is illustrated here, which aims to realize a systematic comparison between teachers of schools of different order and grade of the territory for the exchange of good practices, and create a link with administrators and school staff of local authorities that allows, in the face of common problems, to provide coordinated and structural answers.

This comparison and this connection start from the analysis of a dashboard of indicators and school data (related to learning, outcomes, choices in the transition from I to II cycle...), processed using different funds (INVALSI, Regional Register of Students, ISTAT...) able to bring out objectively some critical issues and to orient the strategic policies of the various subjects who share the responsibility for training. One of the recommendations of the European Council of 28 November 2022 on pathways to school success is to "further develop or, where appropriate, strengthen national data collection and monitoring systems, regional and local authorities, which systematically collect quantitative and qualitative information on learners and on the factors affecting learning outcomes, in particular the socio-economic context".

Subject matter, objectives and research assumptions. The project idea is to create moments of encounter between subjects in various capacities interested in training (schools, EE.LL., representatives of the Boards of Institutes) to identify the most important problems of the territorial school system and of the individual schools that are part of it with regard to school failure and the fragility of students' basic skills, to identify the weight that some factors have on the learning path (gender, family background, migration, the regularity of the school path) and then propose coordinated improvements based on a comparison of the most effective practices coming from schools and territories.

To realize the project idea, the following actions were carried out.

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<sup>6</sup> [https://unesdoc.unesco.org/ark:/48223/pf0000379381\\_ita](https://unesdoc.unesco.org/ark:/48223/pf0000379381_ita)

1. Preparation of a platform of school indicators that allows to compare the result data in the Valdera as a whole with the benchmarks of Tuscany, Italy and the Centre and to detect the positioning of each school in the Valdera (it is 15 Institutes of different order and degree) compared to the average data of the area. The platform also allows to detect the trend for each spatial reference.

The indicators shall cover:

- learning data
    - o student learning levels in the INVALSI tests from 2018/19 to 2022/23 for Grades VIII and XIII;
    - o the results related to the following factors: gender, migration background (I and II generation), family background, regularity or not of school career.
  - context data
    - o pupils with non-Italian citizenship from 2018/19 to 2021/22 (numbers and nationality, percentages I and II generation) recorded by order of school and by municipality.
  - school failure/success data
    - o non-administration outcomes from 2017/18 to 2021/22;
    - o the results of Italian and foreign students;
    - o the grade of diploma (I and II grade) attending and resident, Italian and foreign;
    - o the type of II degree by Municipality.
  - remote results
    - o the choice in the passage from the I to the II cycle (graduates 2020/21 and 2021/22);
    - o differences in choice by gender, family background, migration and graduation.
2. Realization of meetings, addressed to teachers, EE.LL, representatives of the Board of Institute, to illustrate in each of the territories of the Valdera (Educational Institutions and Municipalities of reference) the data and especially to present the platform so that each user can independently search for the data of interest and choose the path of study that he considers most useful.
  3. At the end of the meetings, carrying out workshops, aimed at school staff, administrators and staff of the School Offices of the Municipalities, aimed at identifying strengths and weaknesses through the analysis of the platform data, to discuss, to identify the actions and initiatives implemented by schools and territories, to propose common actions aimed at improvement.

The themes addressed in the workshops:

- The gender difference in learning: the INVALSI tests of Italian and Mathematics
- Choice/orientation in the transition from first to second cycle
- Students with non-Italian citizenship: implicit and explicit dispersion
- The effects of pandemic learning.

4. Restitution meeting: report of the workshop activities by each working group.

The aim is to: To create a common working methodology between school and local authorities, using quantitative analysis to define common improvement strategies.

To spread a culture of data both for the identification of school and training needs and for the control of the results of improvement initiatives put in place.

Strengthen the school-territory alliance in order to make systematic the comparison and the search for suitable solutions to support the educational success of the students of the Valdera.

Objectives

Through the training path:

- initiate an analytical reading of school data, identifying the characteristics of the school system as a whole with respect to regional and national references and the specificities of each individual territorial system;
- to note the major critical issues that the data highlight, to discuss the possible causes and the measures implemented by both schools and territories aimed at overcoming these critical issues;
- compare and disseminate the best practices present in Valdera (the network of schools as learning organization expanded);
- outline common strategies between schools and local authorities to address the issues identified as priorities.



Objectives and possible advantages of the use of the platform by the different subjects

The schools

- To deepen the level of analysis carried out with the path of AV
- To detect school specificity and student needs
- To guide educational and organizational choices

The administrators

- To grasp the strengths and weaknesses of the local training system
- To identify priorities for action
- To guide the definition of common improvement strategies with schools

The School Offices

- To carry out a needs analysis based on objective data
- To support the planning and design of zonal educational projects (dispersion, inclusion, orientation)
- To monitor interventions

Data used. The schools of the network have made available the microdata INVALSI (2018/19-2020/21-2021/22-2022/23) that have allowed to elaborate a data zonal (Valdera) relative to the levels of learning in Italian, Mathematics and English (Listening and Reading) of students as a whole and by categories (gender, family background, migration, regularity in school).

The Regional Student Register has provided the data necessary to process zonal and school data for: foreign students, success/failure at school (from 2017/18 to 2021/22) grade, chosen in the transition from 1st to 2nd cycle and success/failure of such students at the end of the first year of 2nd grade secondary (graduates 2020/21 and 2021/22).

Method. The following methodology was used for the analysis of the data:

- Reading the data provided by the platform
- Comparison with available external references
- Contextualisation
- Interpretation

For data and platform illustration meetings:

- Presentation of the platform: the consultation areas and filters, the possible paths of study
- Evidence of use of the platform by some participants

For the laboratories:

- subdivision into working groups of two/three schools and representatives of the reference territories
- guided path and completion of a format divided into:
  - or data analysis
  - or reflection on data
  - or what schools do
  - or what the territories do
  - or proposals

For the return:

- presentation by each group through a slide template and directions to follow

Administration of a satisfaction questionnaire related to each of the stages of the path.

Results. Awareness by participants of the relevance of some school issues that are hidden or less evident than others: e.g. the gender difference in learning, the differences in the choices of Second Level educational institutions and in the addresses of different categories of students, the difficulties of non-Italian students, including those of the second generation; the relevant weight of some factors on educational and educational success such as family background.

Identification of the priorities of intervention in the medium-long term associated with a package of educational and organizational proposals presented in agreement school/ EE.LL.

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**Keywords:** Alliance school/ territory, School network, Quantitative analysis, Learning organization, Community pact, Measures to combat school dropout and fragility in skills

## Governance and teaching, data that helps difficult changes

Francesca Cimmino

Introduction. It is important to start a process of planning, management and evaluation of the activities proposed by educational institutions, with objectives that are as unitary as possible and shared by all the actors of the educational community. Optimizing projects in favor of solutions and strategic choices that bring results in various reportable areas is the task of the Headmaster and his staff. However, it may happen that the numerous projects that the school plans to implement sometimes create difficulties in

orienting teachers, students and families towards a shared strategic line (both internally and when it is then communicated externally from an accountability perspective). As an Instrumental Function for the evaluation and compilation of the institute's programmatic documents, I work closely with my Headmaster in planning all activities (teaching and research), managing their implementation, as well as subsequent evaluations of the system. Reading and interpreting the Invalsi data returns is one of my most important tasks, unmissable events in August and November when we check the progress of Italian, mathematics and English learning, the school effect and the differences between classes. The data always surprises us, they are an inexhaustible source of shared fears, of reflections on school governance, of didactic research proposals for improvement which in October fill the PTOF to be approved by the teachers' board.

Object, objectives and research hypotheses. Many of my school's decision-making processes are influenced by reading what is returned to us by Invalsi, which also depends on the contextual data entered before the national tests and on the completion of the questionnaires after the eighth grade tests. We participated in the TIMSS surveys (we are awaiting the returns for 22/23) in some experiments proposed by INDIRE, all of which constitutes a basis of information that we interpret, also in relation to the territorial and socio-cultural context in which we operate. The objective is to show one or more improvement processes that we are implementing and monitoring for external and internal reporting. Some of these initiatives can be documented through memoranda of understanding, experimentation protocols and characterizing curricula. We are in fact about to undertake collaboration with researchers for the use of DBOOKS in the classroom, on the basis of not too reassuring data from the post-covid national tests. And we are working (we are finally in the empirical phase) on strategic orientation with the higher education institutions in our area (program included in the Scientix Italia seminars): distinctive vertical curriculum to connect the last two years of the first cycle with the first two of the second through shared teaching activities and a common evaluation grid.

Data used. Invalsi refunds 21/22 - 22/23 (the results of the entrance tests and those shared every four months also start from the data of the first classes of secondary school, which are then discussed in the departments). Monitoring of the results of the first and second quarter from the first classes of lower secondary school to the first classes of upper secondary school.

Method. We can speak of a data collection regime that produces a truly interesting quantity of comparative graphs, the result of shared leadership because each school segment of the comprehensive makes use of what is tabulated through the tests, the self-evaluation report (we participated in the experiment of the RAV for childhood and we used the proposed descriptors as a basis for discussion in department meetings between childhood and primary) and the PdM.

The different forms of organizational learning are visible in the actions that we try to activate during the school year, already described in the operational objectives that the Director puts in writing in the Guidelines. Tested by the facts, we do not hide impeding factors that prevent the full realization of what is defined in the act (it will be my task to present and discuss these system biases later). In fact, despite a vision truly focused on the learning of male and female students, we are unable to escape from an obvious disparity in the composition of classes for lower secondary schools which is fully revealed in the comparisons between the results received and the grades at the end of the first cycle.

Perhaps if I refer to the close link between the construction of an educational program for improvement (drawn up by teachers) and its subsequent evaluation (made at the governance level) a distortion emerges: the objectivity of the evaluator, who must read the data with the necessary stratification of meanings that they carry with them, and the degree of perception of ineffectiveness of the learning actors when the return of data is merciless. We therefore think that the evaluation proves useful when subsequent governance decisions are not only informed but "enlightened" (cit.).

Argue. While trying to support and stimulate a culture of research and innovation, many teachers still struggle to consider themselves creators of learning. In this we have detected great difficulties that governance is not always able to resolve. We are aware that student skills are inseparable from the continuous professional learning of teachers and we plan to promote a data culture. We would like the learning processes to overcome the boundaries of status and role and create the conditions for the

creation of a welcoming and innovative environment, especially for students from a more disadvantaged social context, but we are far from that image of school that we had believed achievable after the pandemic.

Closing the circle is the reporting activity which by its nature prefers the data structure and makes the fragilities and strengths of the governance work immediately visible through the graphs: the questionnaires proposed at the end of the year to teachers, parents and staff, are built following the red lines traced by the returns (and also by the number of members), they are developed by the instrumental function but shared by the manager's staff because they must collect as many indications for improvement as possible. Again, the correlation between learning and shared leadership is not always substantial, indeed sometimes it creates the "weaknesses" I mentioned above.

Research supports that there is an improvement in learning where the manager's leadership is not all-encompassing. We find that sharing tasks facilitates us in educational research and in the innovation of governance procedures, but sometimes weakens us in the teachers' performance. In classes where the presence of parents is more cumbersome. Finding out why this happens and whether we are not the only ones to experience it is one of the objectives of my research.

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**Keywords:** Planning, Organizational learning, System weaknesses

## **Schools and territory: a data analysis experience for the definition of common strategic policies**

**Daniela Ruffolo - Rosa D'Anna**

This contribution describes the quality path of Don Milani-Linguiti Comprehensive School in Giffoni Valle Piana, an experience based on shared planning, management and evaluation. Starting from the vision of transformative education aiming to promote equity and cooperation in the education community where the school is set, our institute is designed as a learning organization. Since 2010 it has been playing its institutional role striving for quality, using the data provided by Invalsi on the context, the pupils' results to the tests, analysing the school's added value, comparing them with the data of other similar schools in the region, in the geographical area and the whole country, favouring benchmarking and benchmarking. The school counts a wide range of meaningful experiences, such as the adoption of CAF (Common Assessment Framework) the S.A.P.E.R.I. quality label with its training courses and Audits, the participation to the Indire research-training project *Shared Leadership for a school that learns*, within the European project Learning Leadership for Change (L2C). The last project offered training interventions for teachers and staff in network with other schools, under the supervision of Indire experts in management and communication techniques for a *lean organization* and a model of participated school governance (learning communities).

Objectives: to promote a diffused leadership and activate work groups involved in research and planning, enhancing everyone's competences; to create an organizational environment that involves and boosts the professional capital of the school, favouring motivation, the sense of identity and belonging to the institution; to raise the quality level of the organization and promote cooperation among teachers in order to achieve their shared goals.

The decision-making processes are the result of the continuous work of the school principal's staff, the school principal, the board of teachers, the educational community and the local authorities, within the framework of the learning community inside and outside the school. The main element is evaluation,

that is functional to improve the decision-making process of the school, once combined with transparency and improvement. In this regard Invalsi test results allow to compare the learning levels reached by pupils of different schools, providing the basis for transparency, essential to guarantee the success of the school improvement process and to build up the teachers' community of practice. The school makes choices in autonomy and self-management to improve the pupils' learning level: it adopts innovative practices, improves the teachers' professional competences, involves families and other stakeholders in the educational process. With a view to the continuous improvement and learning process, the school is a *learning organization* that reflects upon its own actions to be innovative and increase the results of the teaching-learning process, as well as the quality of the services. The CAF model and S.A.P.E.R.I. procedures contribute to improve the teaching, organizational and managerial practices of the school and answer the needs of the territory where the school operates. In addition, these experiences have a positive impact on the school leadership, on its organizational and managerial strategies, but also on the teachers' individual performances and on the pupils' learning process. The results achieved in the learning process when analysing and correcting strategies and mistakes allow the school both to improve and adapt to the continuous demands from the society that changes rapidly. Therefore the school must be a flexible organization that is able to answer quickly to the growing needs of the territory, interact and "network" with external stakeholders and promote those who operate in the organization, involving all the members of the community in the process (educational community).

Our school adopts the idea of the school organization as an educational community striving to educate its children in all their dimensions, a community where each individual, with equal dignity and respect for the different roles, works to guarantee active citizenship education, the right to education, the development of the potential of each individual and the recovery of disadvantages. Particular attention is devoted to school inclusion, based on the pupils' uniqueness, on the educational- didactic continuity and to the planning of innovative learning environments.

A "school that learns" pursues the development of the organizational culture as a set of values (shared vision and mission), competences and know-how, giving importance to the role of the middle leaders and favouring a shared and diffused leadership. The promotion of the sense of belonging to a professional community motivates each member of the learning organization to turn ideas into visions and actions, building up a cultural approach based on cooperative learning, dialogue and innovation.

In order to create an integrated formative system particular attention is given to communication and positive relationships both among the different school levels and among internal and external stakeholders. Teachers share opinions, discuss the pupils' Invalsi results, exchange competences and abilities to give birth to new ideas, sharing teaching strategies. Both internal and external communication is simplified and improved in order to share educational choices among teachers, pupils and parents, and to better understand their needs (restorative practices, onboarding and mentoring for the newly arrived and newly recruited teachers). The main goals of the restorative practices are to develop the sense of community and manage tensions and conflicts, restoring damages and building positive relationships, to promote well-being at school, prevent and reduce those difficulties that undermine individual and collective learning processes, turning the school into a "restoring" and "collaborative" organization.

In the self-evaluation process started as Don Milani Infant and Primary School in 2010 and continued by the newly born Don Milani-Linguisti Comprehensive School since 2022, the school has focused its attention on new organizational models and good practices that constantly contaminate, implement and innovate teaching. Some examples are the adoption of outdoor education in the curriculum, extracurricular interventions to reinforce Italian, critical thinking, Maths and English. The vertical curriculum has been aligned according to the performance issues emerged when reading the Invalsi data: entry and final tests are designed by secondary and primary school teachers for the pupils of the fifth form in primary school who will attend secondary school the following year (The "Agenda Sud" PON has been planned by primary and secondary school teachers to improve the pupils' competences in Italian, Maths and English. It has been addressed to the final forms of primary school to activate the vertical curriculum of the school. Lesson planning and tests have been done taking into account Invalsi standardized tests). The teachers' training plan is drawn up according to the board of teachers' needs and the school is involved in several school networks. Don Milani-Linguisti comprehensive school is a

member of Senza Zaino school network and it is the National Senza Zaino school hub for the Community Pacts. It is a member of the school network for Outdoor education and a member of Ashoka Italia community of changemakers. The school diffuses and shares innovative educational practices that actively involve pupils and promote their cognitive processes, such as interventions to regenerate the outdoor school spaces (gardens and courtyards), training and teaching interventions on sustainable development (Rilegno) and research projects promoted by Indire and Piccole Scuole.

The strategies adopted are peer review, PDCA, new and potentially innovative teaching practices, such as outdoor education, Service Learning, subject-based classrooms and flexible learning space, community pacts (Edu@ction Valley), teachers' onboarding, restorative justice.

Results achieved: cohesion among teachers, a wide middle-management staff involving representatives of the three different levels of education in the school, reorganization of the learning spaces, teacher training experiences in Italy and abroad (Erasmus Plus projects), national school action researches, a stronger cooperation with the educational community thanks to cooperative planning (projects #Iosonoambiente, Scuola Viva Por Campania, Educare Insieme and Agency for Social Cohesion)

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**Keywords:** Evaluation, Improvement, Quality, Community of practices, Learning environments

## **Innovative leadership, learning schools and strengthening of self-evaluation strategies: the research table of some school leaders**

**Graziella Arazzi**

Introduction. Over the last two school years, the USR Liguria, in collaboration with the Area Campus Schools, has established a co-planning table for DS and NIV on the issues of self-evaluation, divided into focus groups, analysis of strategic documents (RAV and PTOF), in-depth workshops. If we consider the contents of the RAVs of the Ligurian educational institutions and if we analyze the opinions of the NIVs, a question emerges to reflect on: the self-evaluation of schools, with particular reference to data literacy skills, is generally not correlated to organizational and management. In the drafting of the various RAVs, often bureaucratically delegated to the exclusive action of the NIV, attention focuses more on the reading of data relating to "Educational and teaching practices" and less on the interpretation of elements relating to "Management and organizational practices". For this dimension, the most accurate analysis of the strengths and critical points is found in the "Strategic orientation and organization of the school" area, with particular regard to the use of economic resources and the monitoring phases of the institution's strategies (mission, documentation and research). In the "Development and enhancement of human resources" area, the focus mainly falls on the description of staff training processes and models. As regards the descriptor "Enhancement of skills" and "Collaboration between teachers", generic analyzes are highlighted. Similarly, the interpretative potential of data relating to the "Integration with the territory and relationships with families" area is reduced. In considering the process objectives, synergistic with priorities and goals, those relating to "Educational and teaching practices" prevail.

Faced with this situation, some Ligurian DSs, since last year. s. 2022/2023, have highlighted how a path of authentic self-evaluation cannot be separated from the development of organizational cultures and management processes, aimed at involving all school stakeholders (teachers, ATA, parents, students) in the construction of a complex system, which it learns along the way, also starting from mistakes and failures (Candia, 2023).

In accentuating the "evaluative culture as an integral part of organizational culture" (line of investigation of the Ligurian schools), the identification of critical and strength points becomes a lever for the development of innovative forms of leadership (distributed and communicated). In this context, rigid function charts are reconfigured, generating methods of cooperation between the Manager's Staff, Instrumental Functions, Extended Commissions (PTOF-RAV), partial or technical teaching colleges, and the complex coordinators. At the same time, the self-evaluation path is enriched by the organizational methods of a polycentric system which, by intercepting new indicators, organically connects data literacy to the identification of process priorities and objectives.

To materialize this context, 10 DS of some Ligurian second cycle institutes (with the following breakdown: 4 schools in Genoa, 2 in Imperia; 2 in Savona and 2 in La Spezia) have decided to develop - in the two-year period 2022/2024 - a working group on "Self-evaluation/organizational cultures: towards systemic and proactive leadership" (Paletta, Greco, Santolaya, 2022). Subsequently, the nucleus was implemented by 3 comprehensive institutes in the province of Imperia - Area 7) and - in macro-area mode - by 3 comprehensive institutes in Piedmont (1 in the province of Novara; 2 in the province of Vercelli) and by 1 comprehensive institute of Emilia-Romagna (province of Piacenza). The 4 non-Ligurian CIs were identified on the basis of a previous sharing (pandemic period) of an INDIRE / system documentation path with the 3 Ligurian CIs.

Object, objectives and research hypotheses. The research, involving a sample of 17 schools, was developed remotely (electronic focus group with the DS; cross-document analysis of RAV / PdM; interviews with the relevant NIVs on the drive module). Priority objectives of the investigation:

- Demonstrate to what extent self-evaluation can be enhanced in schools in which the DS addresses and innovates the organizational and management structure, reflecting on forms of shared, open and stable leadership with staff figures, NIV, instrumental functions, school coordinators ( INVALSI, 2014).
- Identify how the increase in data literacy skills, the strengthening of the ability to identify priorities and improvement paths as well as the tendency to trace links between school weaknesses and action

priorities are reflected in the reorganization of school governance, making it open and interceptable by the social actors of the school and the territory.

- Identify strategic aspects for organizational dimensions, management of professional resources and relationships with the outside that consider system evaluation as the cultural fabric of an organization that learns from errors/obstacles, resulting in a form of life emerging from internal relationships and learning educational institution (Morelli, 1997).
- Reflect on the ways in which documentation and monitoring of outcomes and processes lead the school to: enhance professional resources; promote quality training courses; encourage collaboration between teachers; assign new and functional roles of responsibility to staff.
- Define how participation in networks or the coordination of the same, as well as collaboration with external subjects, contribute significantly to improving the quality of the organization and the training offer, ensuring the school's role as a point of reference in the territory for promotion of educational policies, with significant involvement of parents and citizens of various age groups (educational cooperation).

The research hypothesis was to demonstrate that evaluative culture is an integral part of organizational culture. The OECD 2016 report, entitled "What makes a school a learning organisation?", proved to be an important guide, with attention to:

- creation and support of continuous training opportunities for all staff;
- promotion of learning and collaboration teams within the staff;
- creation of a culture of demand, innovation and research;
- creation of a system for collecting and exchanging knowledge and learning;
- learning and exchange with the external environment;
- development of shared leadership for learning.

Data used. The use of data taken from the "School Questionnaire" and relating to the "Organisational and management processes" of the RAV is prevalent; the analysis of the PdMs and the "Organization" sections of the various PTOFs is central; the examination of the responses to the online questionnaires, administered to the NIVs of the identified sample (open field items), is complementary.

Method or approach. A qualitative approach was used (participatory evaluation or co-evaluation), which involved: comparative documentary analysis of RAV and PTOF, published on Scuola in clear and on the websites of the 17 schools involved; focus groups with the sample of 17 SDs on the themes of innovative leadership, connected to widespread communication flows and the construction of effective self-evaluation paths; subsequent administration of a questionnaire to the NIVs of the 17 Institutes on the topic investigated.

Results or argument. The following outcomes emerge from the documentary analysis and focus groups with the DS:

- In the learning organization, the school enhances the staff by taking into account the skills and certifications possessed when assigning tasks. Spaces, tools and materials are made available in the school in order to implement life-long learning processes regarding the self-evaluation of the structure. The DS provides input for the exchange and constructive comparison between teachers and ATA, in relation to improvement styles and strategies.
- The importance of self-evaluation is perceived by the majority of teachers and not only by the NIV if the DS promotes the valorization of professional resources in an organic and proactive way, favoring formal and non-formal groups and supporting specific forms of generative documentation.
- The reading of the data, with multiple voices, is marked by greater precision and concreteness in translating the PdM into a lever for professional development and in strengthening ties with the territory and with the students' families (from users to decision-makers).
- Within a learning organization the DS "gets involved", sharing the self-assessment with various figures, distributing the process on multiple fronts and orienting staff members, plex representatives, instrumental functions to develop decision-making autonomy and forms of horizontal cooperation/active comparison between peers.
- A new organizational culture leads the NIV to focus on the identification of new indicators and to create process documentation, transferable inside and outside the school.

For the NIVs (93 respondents) in the sample, the organizational strategies capable of improving self-evaluation processes include: cross-reading of the RAVs of local schools of the same level (in certain



cases with a similar ESCS index); working tables between NIVs of various schools; Visiting nearby institutes also online; extended sharing platforms with various types of teachers (e.g. new hires).

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**Keywords:** School organisation, Participatory evaluation, Documentation, Improvement

# SESSION 9. EUROPEAN KEY COMPETENCIES AND LEARNING TO LEARN 2

ORGANIZER: INVALSI

COORDINATOR: CRISTINA STRINGHER

DISCUSSANT: ANNA MARIA AJELLO

18 OCTOBER: 4.30 PM - 6.30 PM {ROOM 4 – TEACHING 9}

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## Promoting Learning to learn in schools: a stacked intervention to close the attainment gap in basic competences

Cristina Stringher - Roberta Cardarello - Franca Da Re

Rapid climatic, technological, and political changes produce volatility, uncertainty, complexity, and ambiguity in societies and in education systems (Laukkonen, Biddell and Gallagher, 2019; OECD, 2021; OECD PISA, 2023). It is therefore necessary to orchestrate, apply and update complex competences to face such changes, and Learning to learn (L2L) is central (Ajello, 2018; Binkley et al., 2012; Commissione Nazionale Italiana UNESCO, 2020; Deakin Crick, Stringher e Ren, 2014; European Council, 2006; 2018; European Political Strategy Centre, 2017; Hoskins e Fredriksson, 2008; OECD, 2019; OECD PISA 2010; Smith, 1990; Stringher et al, 2021; UNESCO, 2013; UNICEF, 2012; Wells & Claxton, 2002) as a lever to a) promote a smooth scholastic pathway contrasting drop-outs; b) encourage lifelong competence updating; c) enable integral individuals' development; d) reduce social inequalities (Stringher, 2021), by creating inclusive environments.

L2L is of particular importance for countering inequalities (Mannion, 2021; Mannion e Mercer, 2016) and dropouts, explicit or implicit. Socio-economic status is a determinant of educational outcomes and instruction impacts earnings in adulthood (Van der Berg, 2008), because it influences the acquisition of those *capabilities* that are necessary to function well in school and society, like Sen maintains (Alberici, 2008). Adequate education, therefore, may invert the odds of educational attainment for children and students from disadvantaged backgrounds, and in this framework L2L is a key competence.

In Italy, during the post-pandemic period, L2L is gaining increased attention among scholars and formative institutions (Capperucci, 2020; Cardarello e Scipione, 2023; Cárdenas et al, 2021; Cornoldi et al., 2020; Gentile, 2023; INAPP, Giovannini e Santanicchia, 2023; Marcuccio, 2022; Scipione, 2022; Stringher, 2021; Stringher et al, 2021; Stringher e Patera, 2022; Stringher, 2023). For this hyper-competence to become one of Italian education's primary objectives (Cipollone, 2014), conditions for its use from cradle to grave are necessary and imply ample, constant, and deep dialogue among research and formative institutions.

Since the 2006 and 2018 European Recommendations, much has been done to theoretically define L2L, to support it and assess it in Europe (Deakin, Stringher, Ren, 2014; Hoskins e Fredriksson, 2008; Kupiainen, Hautamäki, Rantanen, 2008; Mannion e Mercer, 2016; Mannion, 2021; Sala et al, 2020) and in Italy (Capperucci, 2022; INAPP, Giovannini e Santanicchia, 2023; Marcuccio, 2009; 2016; Stringher, 2008; 2014; 2016; Stringher et al, 2021; Vettori et al, 2022). Some questions remain unsolved, however: how is this competence acquired lifelong (Demetriou, 2015; Stringher, 2021)? How can it be assessed and promoted in care, scholastic and formative contexts?

The study trajectory started by INVALSI in recent years produced encouraging results to continue a dialogue among researchers and schools. To start a new generation of empirical research on L2L that is theoretically and pedagogically grounded, the authors of this contribution debated and identified crucial themes for the concrete implementation of L2L and (based upon a careful selection of national and international literature) agreed to concentrate on L2L theory, didactics, and assessment.

It is worth noting that L2L studies may draw new life from questions coming from schools, some of which understand the importance of L2L so much as to insert it among the priorities of their self-evaluation reports (RAV). Following their self-analysis, these schools start from the necessity to improve

students' learning in basic competencies (Italian, Maths, English) and identify L2L as a lever for improvement. However, the focal point is that they don't yet know how to promote such improvement and in fact in the literature no articulated interventions are described at least for the Italian context and most of the studies deal with actions specifically addressed to support a few circumscribed aspects of this competence, that are not monitored in terms of improvement of students' learning and basic competences.

The idea that we propose in this contribution is therefore an intervention that could be defined as stacked, i.e. a sum of several interventions supporting as many L2L aspects within a comprehensive institute. This idea is not new, and indeed stacked interventions are very frequent in medical and psychoanalytic contexts (Mannion, 2021) and in the Anglo-Saxon countries also in ECEC services (ex.: Changing Children's Chances in Australia). Stacked or complex interventions "contain several interacting components" (Mannion, 2021: 36). The necessity of a stacked intervention derives from the fact that many small independent interventions may be invisible and may not yield better outcomes, while if combined among them in a logical model, the result may become measurable and visible in terms of learning outcomes, for example in Italian or Mathematics. This is precisely what we proposed to a school starting to work on L2L based on these premises. Our contribution, of theoretical nature, is thus aimed at describing the characteristics of this intervention, whose impact could be measured through INVALSI tests in grade 2, 5, 8 and across several scholastic years within the experimental school, that becomes a community of practices supporting L2L (Stringher e Scrocca, 2021; Brito et al, 2021).

We start from the assumption that, although L2L is a competence acquirable through exposure to school subjects (Ajello, 2018), the mere teaching of curricular disciplinary contents may not guarantee that the learner develops it. Just think about demotivation that teachers capture in many "impossible pupils", or about the scarce autonomy or the inability of students to create links among school subjects (Patera, 2021; Stringher and Patera, submitted). In the literature, a paradox is described on L2L: several international reviews of small-scale studies identified L2L as a promising area of intervention, along with feedback (Hattie, 2009), yet at the same time results of studies to extend it on a large scale appear disappointing (Mannion, 2021). Mannion and Mercer (2016), aware of this paradox, propose a whole school approach in a program organizing several evidence-based stacked interventions, geared to support several facets of L2L in secondary school students (grade from 7 through 9), a phase in which they feel the necessity to know themselves, to forge their own identity and to orient themselves towards further studies.

Key in this proposal is the use of lessons or activities explicitly designed to support L2L components with the request to students to apply the learnt strategies during their school routines, in what Mannion (2021) defines as a taught and embedded approach into school disciplines, particularly useful for transfer of knowledge, abilities, mindset and dispositions from a course on L2L to disciplinary areas of the routine schoolwork. The teaching staff, duly formed, should underline in every lesson not only the contents (*what*) to learn, but also model different modes (*how*) to attain a learning outcome.

Unlike the proposal by Mannion and Mercer (2026), ours is focused first of all on an articulated series of L2L aspects emerging from studies in international and national contexts (Batini, 2012; Brito et al, 2021; Caena e Stringher, 2020; Capperucci, 2020; Cardarello e Scipione, 2023; Marcuccio, 2009; 2016; Pellerrey, 2006; Pellerrey et al, 2013; Stringher, 2021; Stringher e Scrocca, 2021), related to the national curriculum for the first cycle of education (Da Re, 2017; MIUR, 2012) and considers a wide L2L conception (Hounsell, 1979), including not only study strategies, metacognition and self-regulated learning (self-management, self-control, self-reflection and self-evaluation), but most of all socio-emotional and relational aspects: first and foremost, learners' autonomous agency (Stringher, 2021), supported by innate curiosity to learn and a growth mindset (Dweck, 2015), which together trigger motivation to engage in learning tasks with confidence to succeed, creating meaning from what is learnt, linking new acquisitions with past experiences and challenging them with critical curiosity, so to deeply engage with the questions to face, with resilience and without losing heart in the face of difficulties.

The result is a proposal of favorable activities for L2L which can be implemented in a comprehensive institute starting from preschool, in vertical progression through primary and secondary education to

facilitate the delicate transition of students from lower to upper secondary education. The toolkit of activities is accompanied by a series of guided meetings with teachers of the different education levels, through which they are engaged in a reflection on their own ways of learning, that might differ from those of their peers or their students, as a basis to co-construct with the research team the L2L activities to be proposed in their classrooms, with empirical evidence coming from children's, pupils' and students' learning outcomes as measured by INVALSI tests.

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**Keywords:** Learning to learn, Personal, social, and learning to learn competence, Intervention, Evaluation, K-12

## **The learning environment as a facilitator for learning to learn in the transition from preschool to primary school**

**Marta Feliciani - Isabella Cerasa - Candida Buffetti - Maria Di Tonno**

Introduction. In the comprehensive institute of Loreto in the 2022/2023 school year, following an analysis of the INVALSI results, which show various critical issues, a reflection begins on the improvement actions to be implemented to obtain more significant learning outcomes for pupils, through the identification of some priorities, around which the organizational effort of the entire institute will focus on in the three-year reference period of the 2022/2025 Improvement Plan. In particular, the priorities identified for the three-year period refer to improving the school effect and the competence of "Learning to learn".

A self-training process has already been undertaken in the comprehensive institute which has allowed teachers, thanks to an in-depth analysis of the test results returned by INVALSI and the use of the information materials available on the INVALSI OPEN website, to investigate possible approaches to the development of skills and to reflect on their educational, teaching and assessment practices in order to improve school outcomes and results in standardized tests.

The improvement process is now enriched thanks to the design and organization of new learning spaces and contexts that aim to support the student's motivation, curiosity and learning to learn through laboratory activities, functional to the development of skills.

The innovative environments to be created are connected with the adoption of one of the "ideas" of the Avant-garde Educational movement, namely "Disciplinary laboratory classrooms". The process of creating such "learning environments" and experimenting with different teaching practices within them constitutes the subject of this paper.

Object, objectives and research hypotheses. In primary school it is intended to activate a reorganization of the learning spaces with the preparation of settings and equipment functional to the specificities of the disciplines, for the optimal use of material resources, technologies, tools, also obtained through the funds of PNRR. The environments are characterized according to the disciplines taught there. The teacher, together with the students, organizes and structures the spaces, prepares furniture, materials, books, instruments, devices, specific software, in order to promote active laboratory-type teaching. Students rotate between classrooms, depending on the discipline and an organized and shared calendar. Even the corridors, therefore, become innovative learning environments, both because they will be used for coding and educational robotics and because they will host filing cabinets for the use of individual children, who, no longer having a single reference classroom, but rather laboratories in which they will move during the school day, they need a personal space in which to store their belongings and materials. The research hypothesis refers to the fact that a more conscious attention to skills-based teaching, with the use of suitable planning and evaluation tools, and above all a different and flexible organization of learning environments, can contribute to the promotion of learning to learn, as a key competence on which to base the development of significant learning processes.

Data used. The INVALSI data analyzed at Institute level highlight that the school's contribution is not always adequate and the results need to be improved. In the Improvement Plan relating to the three-year period 2022/2025, goals to be achieved have been identified linked to the results in standardized

tests and distance learning results to obtain a school effect at least equal to the regional average in Italian, mathematics and English.

Furthermore, specifically, among the priorities of the RAV is the following: "Improving the competence of learning to learn". One of the process objectives linked to this priority refers to the experimentation, in a sample of primary school classes, of a different organization of learning environments (laboratory classrooms).

Method or approach. The learning environment, organised, experienced, structured and deconstructed in such a way as to keep the child's interest and curiosity alive, is, in preschool, a privileged tool for the free expression and autonomous ability of exploration of the little ones. In primary school, students spend their school time mainly in a single reference classroom, often organized in such a way as to favor static nature and order rather than the possibility of exploring and researching. It is necessary to experiment with a different organization of spaces, which is functional to promoting greater interaction, the development of cooperative bonds, the personal initiative of pupils and consequently the development of learning processes underlying learning to learn.

The Comprehensive Institute therefore decides to experiment, starting from the first classes of primary school, with a different organization of spaces, in continuity with the experience of preschool, in order to create a continuum in the child's experience. In fact, for several years the preschool has been reflecting on the organization of spaces, which it has gradually made more recognizable and better structured, according to the different experiences that children can freely live within them. Therefore in primary school the teacher will reorganize his teaching practices by working more on problems that involve the different disciplines. The following environments will be set up: linguistic laboratory room, laboratory room for the development of logical-mathematical skills, agora for collective communication, artistic-expressive laboratory room, library, scientific-technological laboratory room. Within these environments the teacher, in addition to explaining, encourages participation, coordinates group work, acts as a solicitor, facilitates relationships, encourages and promotes experimentation and the use of materials and tools.

The student becomes a co-builder of the environments, moves freely, manipulates and uses the resources made available, collaborates with classmates and teachers. Teachers will collect data on the actual change in pupils' attitudes over time through the use of observation tools (SVA - Scale for the evaluation of the child's approaches to learning by teachers and parents - INVALSI appropriately contextualised, to verify whether a different structuring of the environment can really positively influence learning.

Observations will be carried out ex ante and ex post the new organization in order to detect and understand any differences. The teachers involved, with the collaboration of the Headmaster and researchers, are carrying out a process of reflection aimed at creating a learning environment conducive to learning to learn. During the experimental process, ongoing and at the end of the first year, the strengths and critical points encountered will be monitored.

Results. With this path we expect an increase in motivation of Learning to learn, the development of positive emotional attitudes, interest in the disciplines and in general in all school activities. It is assumed that a learning environment that is more responsive to children's needs can help preserve the natural curiosity of the student by enhancing the effectiveness of the teaching-educational action.

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**Keywords:** Learning environments, Experimentation, Continuity, Meaningful learning, Learning to learn

## Learning to comprehend in support of learning to learn. A research and training course with secondary school teachers

Lucia Scipione

Transversal competences are not linked to single domains but common to many of them and therefore transferable, both to tasks and to different contexts, and capable of influencing attitudes and strategies implemented by the teacher. Personal, Social and Learning to Learn competence is one of the transversal competences. A recent European competence framework, the LifeComp (Sala et al., 2020), a conceptual and operational framework designed to promote a common understanding and shared language at the European level, identifies and describes a selection of 'teachable competences' within the three areas identified by the European definition (2018): self-regulation, flexibility, wellbeing (Personal Area); empathy, communication, collaboration (Social Area); growth mindset, critical thinking and managing learning (Learning to Learn Area). Text comprehension also has a particular transversal quality among the competences, functional to the learning process and has in common, with the Learning to Learn competence (L2L), productivity in the involvement of the learner, in his active and self-regulated participation in the process, in the necessary metacognitive control. The functional literacy competence, among the key competences, is the one considered crucial for the acquisition of all the others.

The study combines the theme of promoting literacy with that of L2L competence by carrying out a research and training intervention with secondary school teachers. The objectives of the research were to test a didactic pathway aimed at enhancing text comprehension skills, declined to include some of the mentioned characteristics (self-regulation, communication and responsibility for one's own learning) and to provide teachers, through the use of a Teacher Professional Development Research (Asquini, 2018), with a greater ability to enhance these skills by operating within their own teaching subjects. Furthermore, the aim was to improve the teachers' awareness of L2L.

The first phase of the present study, which involved 27 secondary school teachers, highlighted the comprehension skills considered particularly critical, and the selection of those considered of priority importance. On these, the researchers shared and illustrated lines of teaching action considered most promising in the literature and in the perspective of Evidence-Based Education, some coming from the Reciprocal Teaching protocol (Palincsar and Brown, 1984), such as *questioning* and *summarizing* strategies as well as pair work, others, such as thinking aloud, coming from working models on text comprehension (Lumbelli, 1993). The adult is shown as a model to the pupils and this is also assumed to be important for pupil motivation, a condition for the effectiveness of a teaching intervention (Ibid.). Teachers and researchers designed the instructional intervention together, which was implemented directly by teachers in each experimental classroom. Starting from the results of this pilot experience, in the second year (2023/2024) a small group of these teachers was involved in a controlled experimentation that made it possible to formalize the pilot proposal. The second phase, which is still ongoing, involves the systematic application of the above mentioned scheme, but applied to different reading and learning tasks: each teacher applied it to different content, consistent with the different teaching disciplines.

The study involves approximately 140 students from 6 experimental classes, from grade 6t to grade 9t, and 6 teachers from 5 different disciplines. The experimental intervention, for a total of 10 sessions, proposed the repeated application in pairs of two of Reciprocal Teaching's text comprehension strategies, *questioning* and *summarizing*. The teachers experimented with and applied the *modeling* strategy, such as reading aloud, and modeled the use of the two strategies. Intermediate meetings of the team of teachers and researcher allowed for a remodeling of the proposal and deepened the strategies on the basis of the criticalities and potentialities that emerged during the application phase. Working on sustaining the motivation to learn over time and the transferability of skills to other contexts seems a priority.

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**Keywords:** Transversal competences, Learning to Learn, Literacy, Secondary school

## **Learning to Learn at University: Cultural adaptation and piloting of a semi-structure interview**

**Hugo Armando Brito Rivera - Cristina Stringher**

Learning to Learn (L2L) is a key objective of different educational systems and levels, from early education to university education (Marcuccio, 2016; Deakin Crick, Stringher & Ren, 2014). This competence has been part of the educational debate for the last 50 years and has given rise to the development of various lines of research, that encompass both cognitive and non-cognitive aspects (Ajello & Torti, 2019).

L2L is considered a transversal competence for lifelong learning, according to different international organizations, such as the European Commission (2007, 2018), the Organization for Economic Cooperation and Development (OECD, 2009) and UNESCO (2013). Various components that integrate this competence, such as self-regulated learning or socioemotional skills, have been considered in multiple school curricula. This is the case, for example, in countries such as Argentina and Mexico in Latin America (Patera, 2018; Stringher et al., 2019), or Spain (Moreno & Martín, 2014) and Finland in Europe (Hautamäki & Kupiainen, 2014). From a general perspective, L2L is defined as a set of skills needed to face the rapid transformations and challenges of current societies, such as climate change, technological development or the effective management of increasing volumes of information. Recently, the need for L2L and the development of the ability to continue learning in contexts of uncertainty gained notoriety in the school environment due to the challenges produced by the SAR-cov-2 virus pandemic (cfr. Jones & Kessler, 2020).

As part of a continuum of constant changes in the dynamics of contemporary society, higher education institutions in different parts of the world have undertaken educational processes of reflection and change, leading to the adaptation or modification of their respective teaching-learning models. This is the case of the Iztapalapa Autonomous Metropolitan University in Mexico (*Universidad Autónoma Metropolitana Iztapalapa*, hereinafter UAMI), where L2L has been incorporated as a strategic educational aspect, both in relation to the new Academic Model of Collaborative Construction of Learning (*Modelo Académico de Construcción Colaborativa del Aprendizaje, MACCA*) (UAM, 2022) and with respect to operational teaching policies. The new model involves educational innovations in favor of a student-centered teaching-learning process to face uncertainty. Although the new educational model includes the development of L2L competence, there are no studies about how the university faculties conceive and culturally represent this concept.

Different international studies point out the importance of teachers' conceptualization of L2L, linking it to its potential development in classrooms (Cárdenas et al, 2024; Mannion e Mercer, 2016; Mannion, 2021; Stringher et al, 2021;). Other studies indicate the importance of the orientations and activities carried out by teachers in the formation of L2L in students (Brito et al, 2021; Brito, 2021). According to the sociocultural perspective of L2L (Claxton, 2014; Stringher, 2021; Wells and Claxton, 2002), the formation of L2L in educational contexts is mediated by the meanings that are part of everyday practices (Bruner, 1990; Rogoff, 2003; Sfard & Prusak, 2005), representing an emerging field of research that adds to the developmental studies around this competence (Stringher, 2021).

Since L2L is a recently incorporated concept at UAMI, it is useful to investigate the representations and conceptions of the teaching staff regarding this competence, with the aim to systematize a cultural map based on what is considered valuable for teachers at this university. Given that research on L2L has had greater development at the primary and secondary education levels, the study of teachers' conceptions and representations on L2L in university contexts (Gargallo et al, 2020, 2023) emerges as a necessary step to understand the current state of university educational practices and identify useful aspects for the potential development of the new model. In addition, this type of study could also shed light on the need of pedagogical and didactic continuity from primary and secondary through tertiary education in supporting students' L2L competence acquisition, because if freshmen enter university without learning abilities, it could be harder for them to sustain the higher demands and expectations of teachers in this

education level. As a matter of facts, the lack of L2L competence could well be a primary cause of dropping out of university for many students belonging to disadvantaged backgrounds, thus perpetrating inequalities.

Based on the above approach, the objective of our contribution is to present preliminary results of the adapting process and piloting of a semi-structured interview focused on the sociocultural perspective of L2L (Stringher, 2021) for its application in the educational context of UAMI. The interview was developed by INVALSI in the framework of an international project on L2L carried out in Brazil, Ecuador, Spain, Italy, Mexico and Uruguay and is composed of 21 questions organized in 9 thematic categories (Torti, Brito & Patera, 2021). The original interview was designed based on its application with teachers of students aged 5, 10, 13 and 15 years, belonging to preschool, primary, and secondary school levels, respectively (Torti, 2019; Torti et al, 2021).

For its use in the university setting, the cultural adaptation strategy proposed by Brito, Torti and Carvalho (2020) was used. The general objective of the adaptation and piloting process consisted of verifying the suitability of the interview in terms of a different educational context, identifying key changes in relation to the original interview guide. This process required revising the formulation of questions, thematic categories, translation, and tone of language used. A hybrid validation method was used, consisting of 4 pilot interviews, as well as the validation and review of the guide with local experts (Losito, 1988).

The result of this strategy, based on an *emic* and hermeneutic approach (Montesperelli, 1998), led to the construction of five categories: (1) review of the themes that make up the interview; (2) review of the Spanish translation of the original interview in Italian (cfr, Roth, 2013; Van Ness, 2010); (3) adequacies of the language and formulation of the questions; (4) verification of the elicitation of authentic responses, contrary to eliciting responses influenced by social desirability or the use of professional labels; (5) preliminary representations on L2L: emergence of narrow conceptions of learning to learn. This last result seems in line with the results obtained from the international study (Stringher, 2021). It is considered that the set of narrow conceptions identified in the piloting of the interview contributes to weighting the correct functioning of the interview, by replicating results obtained in different countries and educational contexts as a part of the international study. The preliminary results also show the coherence between the current state of conceptualization of L2L in the participating university context in terms of the recent creation and dissemination of the MACCA model.

The results approached in the 5 categories above mentioned provide a useful data set for the conduct of the main study in the medium term, consisting of the application of the interview with university teachers. It is hoped that this will support the continuity of the international study coordinated by INVALSI by extending its scope to the tertiary education level. The data presented have the potential to inform teacher training processes on L2L at the university level. Based on the preliminary results obtained, the set of narrow conceptions of the participating teachers about learning to learn indicate areas of suitability for the design of a training program conducive to working on this competence. The preliminary prevalence of aspects linked to cognitive or socio-affective domains points to the need to incorporate in such training program the use and role of student assessment in the formation of the L2L competence.

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**Keywords:** Learning to learn, Higher education, Educational research, Transversal competencies, University teachers

# **SESSION 10. KEY COMPETENCIES, TRANSVERSAL SKILLS AND CITIZENSHIP EDUCATION 1**

**ORGANIZER: INVALSI**

**COORDINATOR: CRISTINA STRINGHER**

**DISCUSSANT: ELISA CAPONERA**

**19 OCTOBER: 11 AM - 1 PM {ROOM 2 – TEACHING 10}**

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## **Teaching for the development of key competences**

**Franca Da Re**

The European Recommendation of 22 May 2018 on key competences for lifelong learning, as well as the one on the similar topic that preceded it, of 18 December 2006, indicated eight indispensable competences that every citizen should achieve and develop throughout life.

Of these, five are based on specific cultural knowledge, skills and specific competences which are developed in the school through the study disciplines and represent the fields in which human investigation and action unfold. The other three, Personal, social and learning to learn competence, Competence in matters of citizenship and Entrepreneurial competence indicate, however, the way in which investigations, actions, procedures are conducted and implemented both with respect to methods, techniques, strategies, and depending on attitudes and dispositions towards the task, other people and the common good. The latter three do not have disciplinary knowledge and skills as their basis, but are deployed in the context of personal, social, relational skills, learning and research methods, the ability to collaborate and interact with people and the community, to act in a rational, flexible, creative way, to manage situations, solve problems, make choices for the common good.

The European Commission has licensed two frameworks to support actions to develop personal, social and learning to learn competence and entrepreneurial competence, respectively Lifecomp (2020) and Entrecomp (2018).

For the development of citizenship skills, there are various international references, such as the Council of Europe framework "Skills for a culture of democracy", the 16 skills for the 21st century of the World Economic Forum, the framework on "global competence" of the OECD. At a national level, we remember law n. 92 of 2019 on the teaching of civic education.

Research object and hypothesis. The object of research concerns the ways in which non-cultural skills are defined in school curricula as learning outcomes, their development in teaching practices and evaluation.

Both national indications and guidelines and school curricula rarely describe the learning outcomes related to the competences in question, since generally both national guidelines and school curricula focus more on skills of a more cultural nature, which have direct references to the disciplines of study. Even in the RAV framework, the area relating to key skills, unlike the others, does not have indicators provided at a national level.

More than a research hypothesis, the observational findings illustrated here could inspire finalized research in the field. The hypothesis is that a setting of school curricula on European key competences and a consequent precise description in terms of knowledge, skills and specific competences of the learning outcomes relating not only to the five competences of a more cultural nature, but also to the other three, would allow us to plan more rigorously effective educational paths for the development of personal, social and learning to learn, citizenship and entrepreneurial competences. It would also facilitate the formulation of educational paths where these competences are pursued in a systematic and intentional way by all teachers.

Data used and method. The method used is qualitative: observation in the field, over many years of analysis of national documents, school curricula and teaching practices in schools of both the first and second cycle of education, as well as teacher training courses and direct discussions with them in the

field of training, educational consultancy activity (over 200 Italian schools, mainly in the North East, from 2007 to today) and the external evaluation of 20 schools in Veneto, Friuli, Emilia Romagna and Lombardy and from the evaluation of 25 Venetian school principals, from 2016 to 2019.

The data used comes from the institutes' PTOFs, the RAVs, the school curricula, and interviews with teachers and headteachers.

The generally observed results show that personal, social and learning to learn competences, as well as entrepreneurial ones, are rarely precisely defined and described in curricula. It follows that in teachers' committees and class councils there is no real agreement on the nature of these competences, nor on how to help students develop them.

In the curricula and in the plans of the class councils and of the individual teachers observed in the field, these competences are generally stated without following protocols to pursue them, which instead happens more punctually for the cultural skills that refer to the disciplines.

Teaching practices do not take into account non-cultural skills in an intentional and widespread way. In some ways, competence in the field of citizenship is an exception, because law 92/2019 has dictated directions to schools, even if the teaching of civic education still has many critical issues.

There is also difficulty for schools in compiling the RAVs in relation to the area of results relating to key competences: effective indicators are not defined and those present are often formulated not in terms of results, but of processes.

The interviews conducted among teachers as part of the external evaluations of schools showed that generally the dimensions related to non-cultural competences are not systematically taken into account in the Teaching Councils and that the actions are more often carried out by individual teachers, each with their own techniques and strategies not shared collegially.

The literature on the topic of competences development, as well as the field observation of the experiences, even if not systematic, implemented by schools have shown that accurate curricular planning and a consequent formulation of coherent teaching paths can contribute to the development of all key competences, especially non-cultural ones. It involves planning proposals and setting up learning environments that involve the active participation of students in the learning process and self-evaluation, predominantly inductive approaches to learning, laboratory teaching, based on planning and research, attention to the development of research methods and the scientific method, collaborative and cooperative organizations within groups and classes.

Conclusions and perspectives. In conclusion, it is believed that a precise description of non-cultural competences starting from the content of the European Recommendation in school curricula which is the subject of intersubjective agreement between teachers would help plan timely teaching paths both dedicated and within the different disciplines to help students to develop these competences and to allow their observation and evaluation.

Teaching and learning environments based on knowledge, skills, attitudes connected to key skills and already suggested in the Recommendation, show that they have greater chances of success in the development of these competences. However, this also presupposes accurate training courses for teachers, both those not yet in service and those already in their careers, to orient them towards a very profound change in practices far removed from the experiences they had as students and implemented up until now, as career professionals.

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**Keywords:** Key competences, Non-cultural competences, Curriculum, Educational paths, Learning environments, Training of trainers

## “Transversal-mente”: defining, observing and evaluating key European and civic competences

**Cinzia Spingola**

Marco Polo descrive un ponte, pietra per pietra.  
 - Ma qual è la pietra che sostiene il ponte? – chiede Kublai Kan.  
 - Il ponte non è sostenuto da questa o da quella pietra, - risponde Marco, - ma dalla linea dell'arco che esse formano.  
 Kublai Kan rimane silenzioso, riflettendo. Poi soggiunge: - Perché mi parli delle pietre? È solo dell'arco che m'importa.  
 Polo risponde: - Senza pietre non c'è arco.

Italo Calvino, *Le città invisibili*, Einaudi, Torino 1972.

Introduction. To support the educational success of students, in today's complex society, schools are called to teach and evaluate using soft skills, within an interdisciplinary network.



The citation in exergue of Italo Calvino is very significant in this regard: every stone (alias every discipline) is indispensable for the construction of a bridge (alias knowledge), but what really matters - says Marco Polo - is the arch (alias critical training) that each stone contributes to form together with the others.

Today, in addition to the *Indicazioni nazionali per i Licei*, dalle *Linee guida per gli Istituti Tecnici* e dalla *Riforma dei Professionali*, the interdisciplinary approach is required by the key European competences relevant to lifelong learning and the conscious exercise of citizenship: from Civic Education with its goals and thematic core (L. 92/2019 and Linee Guida adopted in D.M. 35/2020), the new written tests and the State Examination.

In the context of self-assessment, acquiring tools and strategies to define, observe and evaluate transversally, becomes essential to trace clear and adequate indicators of the results achieved by students, for example, in the area of key European competences. The *Guida all'autovalutazione per le scuole statali e paritarie del I e del II ciclo* (RAV 2022-2025), edited by Area 3 Valutazione delle scuole dell'INVALSI, reiterates that the Italian school system assumes all the competences adopted by the European Parliament and the Council of the European Union with the Recommendation of 22 May 2018, as a reference educational horizon.

As is well known, however, in this area INVALSI does not provide explicit national indicators but limits itself to guiding with some questions the self-reflection of the Internal Evaluation Units (NIV), to leave to the schools free to choose the most significant ones for the organizational and formative contexts of belonging.

In this field, as evidenced by the Self-assessment Reports (EWS) examined, the work of individual educational institutions is not always easy, therefore they could benefit from concrete examples and further suggestions to document precisely what they are doing in the civic sphere, to describe and evaluate it without ambiguity or approximation, in order to have evidence and clear findings, including key competences, to be used to define targets and process objectives consistent with any criticalities identified, measurable in the Improvement Plan (PDM) and socially accountable.

Subject matter, goals and research assumptions. The present contribution deals with the self-assessment and the transversal evaluation of the European key competences that, concretely teaching, are intertwined with the goals of Civic Education, whose paradigm goes beyond disciplinary boundaries.

The objective of the contribution is twofold:

- a. firstly, it intends to bring to the attention of the NIVs, engaged in self-assessment analysis and reflection, some elements of comparison with the work carried out by other schools in the area of key European competences, in order to enhance in that field their ability to define, document and collect evidence, data and results relating to individual classes and/or the entire Institute, useful for the choice of measurable process targets and objectives and reporting, to share with the school community and families;
- b. secondly, it aims to provide teachers, Departments and Class Councils with some theoretical and practical ideas to precisely define transversal indicators and descriptors (with related evaluation sections) to be used in interdisciplinary teaching on transversal civic competences.

The proposal makes use of the analysis of some RAV coming from schools in Veneto, mostly secondary school.

The contribution stems from the awareness that the self-assessment of schools is always a complex process, especially when there are civic and transversal skills to be evaluated, and requires valuable collaborative work, still not very widespread in secondary school grade II.

Data used. The section of the Outcomes of Key European Competences in the RAV 2022-2025 of some schools in Veneto (ca. 15 of the different provinces), especially secondary, accessible in Scuola in Chiaro, shows how complex is self-assessment, especially in the area considered, and suggests promoting opportunities for dialogue between schools, to be supported in the refinement of their paths of self-assessment and improvement both with theoretical ideas (cf. INVALSI materials), both with didactic and operational examples.

Method or approach. The contribution, starting from reading about fifteen RAV of secondary schools of the various Venetian provinces in the period 2022-2025, intends to outline, albeit in very partial and provisional form, some common feature in the way educational institutions analyze and reflect how

pupils the acquire key European competences and the space given to this area in their improvement plans.

The empirical approach will be supported by the proposal of indicators for documenting and evaluating civic competences (headings) and reinforced by the most recent literature on evaluation themes, teaching by skills, interdisciplinary teaching and the transversality of Civic Education.

Findings or argument. The examination of the RAV, in the Outcomes of Key European Competences section, reveals at least three different attitudes of the NIVs of the schools, each of which will be documented by concrete examples:

- a. the first asks us not to dwell on the complexity of the area and to ignore the guiding questions provided by INVALSI: the analyses are mostly elliptical or hasty, the judgments little documented and substantially useless for the improvement;
- b. the second leads the schools to compile the section on European key competences and the expression of judgment in an approximate way, following only partially the guidance questions provided by INVALSI, with the result that even the goals and process objectives related to that area appear equally generic and poorly accountable;
- c. the third one, on the other hand, is representative of those schools which, drawing on the guidance questions provided by INVALSI, document in detail the outcomes of key European competences, starting from the selection of precise transversal indicators and outcome data, on the basis of which they pursue goals and process objectives consistent with the criticalities to be improved. The compilation of the RAV of the latter schools shows their fundamental focus on teaching and assessment by skills and their transversality.

The skills approach is likely to fail if, as Philippe Perrenoud (2013) writes, in addition to teaching, «evaluation procedures, what is evaluated and how is evaluated are not transformed»; likewise a self-assessment based only partially on certain and well-defined data, risks reducing the effectiveness of the improvement's efforts towards which all evaluative self-reflection of schools tends.

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**Keywords:** Skills, Evaluation, Civic education, Transversality, Indicators, RAV

## The role of school context in learning civic knowledge

Ines Di Leo

The international comparative survey IEA - ICCS (International Civic and Citizenship Education Study) aims to assess knowledge and skills in civic and citizenship education of students attending the third year of secondary school.

As described in the theoretical framework (Schulz et al., 2023) student's civic knowledge refers both to knowledge (information) but also to reasoning and application of knowledge to real situations.

In the survey much importance is given to the contexts in which the learning process develops, among them the school plays a very important role, in addition to the community, the family along with the peer group (INVALSI 2016).

In ICCS, school context is considered as a learning environment in which democratic values are integrated in teaching, educational methodologies and practices and also in school organization: in this context students can therefore active participation and experience mutual respect, a classroom climate open to discussion, positive relationships with teachers and respect for diversity. (Schulz et al., 2023)

Within the school context, in fact, the student learns both through lessons (formal learning) and extracurricular activities but also from the experience he/she lives daily with peers and teachers; these aspects, in addition to fostering the development of knowledge, also affect attitudes, dispositions and civic engagement (INVALSI, 2016; Scheerens, 2009).

In the Italian context, since 2020, civic education has become a cross-curricular discipline that is taught from kindergarten through secondary school, (Law 92 of August 20, 2019) and the results of the 'survey show that, in our country, this teaching is mostly integrated into all subjects, or included in the area of human/social sciences.

Therefore, it becomes very important to investigate what factors at the school level may be influencing students' civic knowledge in order to have indications that may be useful in the work of designing teaching activities especially in terms of the methodologies to be used.

Several research studies have shown that openness in classroom discussion is a very important factor in promoting the teaching of civic and citizenship education (Schulz, et al., 2008); the teaching methodologies used during civic and citizenship education classes also play an important role, in fact, the Council of Europe (2018) suggests the use of engaging practices using interactive tools to promote learning.

In addition to the classroom setting, schools can also foster the development of civic knowledge by promoting student participation in decision-making processes within them (Schulz et al., 2023)

The purpose of this paper is to explore the influence of classroom- and school-level variables in learning civics and citizenship education by going into detail about concrete practices. The presence of differences at geographical area - level within Italy will also be investigated.

Italian data from ICCS 2022 will be used, a sample including 230 schools with a total of 4373 students and 2121 teachers. Part of students (about 65 %) administered the cognitive test and the questionnaires in paper mode while about 35% used the digital mode (INVALSI, 2023). Teachers and school principals, answered questions by online questionnaires.

The database on which the analyses were conducted includes the students' cognitive test results and related questionnaire responses (including internationally calculated indices), but also the responses to the questionnaire addressed to School Principal and teachers.

Descriptive and multivariate data analysis methodologies were used to process the results.

In the first part of this work, using descriptive analyses, it is investigated whether there are differences among the Italian geographical macro-areas with regard to the topics of interest of this work, such as students' participation in school decision-making processes, teaching methodologies that civic education teachers use during lessons (interactive methodologies), the civic activities carried out at school also in collaboration with external groups and organizations (various activities) and openness in classroom discussion.

Also analyzed is whether (and to what extent) student background variables and school- and classroom-level variables affect the learning of civic knowledge.

The results mainly showed that openness in classroom discussion affects Italian students' achievement in the ICCS 2022 survey.

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**Keywords:** Civic and Citizenship Education, Civic knowledge, School context

## **What Civic and Citizenship Education? Evidence and Proposals from the ICCS 2022 Survey**

**Sabrina Greco - Bruno Losito**

Introduction. In Italy, the Law n. 92/2019 introduced the cross-curricular teaching of civic education in first and second cycle of instruction. About two years after the law comes into force (school year: 2020/2021), the international survey IEA ICCS 2022 (*International Civic and Citizenship Education Study*) measures the civic knowledge, attitudes, behaviour, and expectations of students in 22 countries, including Italy. ICCS 2022 also provides important information on the contexts in which civic and citizenship education is delivered, the ways in which it is taught, and students' opportunities to learn in this area in their eighth year of schooling, the last year of secondary school in Italy (approximately 13.5 years of age).

Due to the timing of the survey, ICCS 2022 also, represents a great opportunity for our country to gain a closer insight into the implementation of civic and citizenship education (CCE) in Italian schools. ICCS also provides information about the teaching and learning activities most frequently carried out in the classroom.

ICCS results also make it possible to highlight which are the most important objectives of civic and citizenship education for Italian teachers, how prepared they feel they are in teaching various topics, and their perceptions of students' learning opportunities students. From this perspective, ICCS results may also be considered as a starting point for the development of innovative teaching proposals in the field of ECC.

ICCS allows us to reflect on the role of civic and citizenship education at school and on the importance of the many topics that pertain to this area of school education according to the current legislation.

Civic and citizenship education is a curricular area of great value and importance. Schools play a central role in preparing young people for their role of citizens (Dewey, 1916). CCE is included in the national school curricula of almost all countries, but it is implemented in different ways: in some countries it is taught as a separate subject, in other countries it is integrated within related disciplines, such as social sciences, or it is considered as a cross-curricular area (Ainley et al., 2013; Eurydice, 2017; Schulz et al., 2017).

In recent years, because of the growing demographic, environmental, economic, and social challenges and because of the emergence of transnational interconnectedness, new objectives have been attributed to civic and citizenship education (Schulz et al., 2023). In response to concerns related to global threats

to the environment and the sustainability of socio-demographic and economic development, the topic of sustainable development has begun increasingly important both in public debate and in education. The UN Agenda 2030 (UN, 2015) set the 17 Sustainable Development Goals (*Sustainable Development Goals – SDG*) to be achieved by 2030. These are common goals that countries have set themselves on issues of fundamental importance. These goals are related to three dimensions of sustainable development: the economic, the social and the environmental dimensions.

In Italy, the Guidelines that accompanied the entry into force of Law 92/2019, highlighted three main themes: “Sustainable development, environmental education, knowledge and protection of heritage and territory”, “Constitution, law (national and international), legality and solidarity”, and “Digital Citizenship”.

The broadening of the concept of sustainability is also evident in the ICCS survey. In the ICCS 2016 Assessment Framework, civic and citizenship education included environmental sustainability; ICCS 2022 proposes a broader concept of sustainability, putting the environmental dimension alongside the social and economic dimensions.

Purpose and research hypotheses. Starting from the results ICCS 2022, the study has two objectives. The first one is to describe, using ICCS results, how ECC is implemented in Italian lower secondary schools (mainly with reference to grade eight), what learning opportunities students have, which objectives are considered as the most important by Italian teachers and which ECC-related topics are part of their initial and in-service training.

The second one is to describe how education for sustainable development is implemented in our schools, through an analysis of classroom activities reported by teachers and students in ICCS. The purpose of this analysis is to propose examples of possible teaching and learning activities that can be implemented both at a school and at a classroom level.

Method and Data. The study uses data from the Italian sample of the IEA ICCS 2022 international survey, consisting of 226 lower secondary schools of 4347 grade eight students, and of 2121 teachers. In the analysis, data collected through the teacher questionnaire, the international student questionnaire, and the European student questionnaire are used.

The study uses a descriptive approach, providing estimates of the population of Italian grade eight students and teachers. Analyses are carried out using the IDB analyser software, provided by IEA.

*Results.* The importance of civic and citizenship education for the education of young people is highlighted by the attention given to this area at international level. The events that are characterising our time require that this attention remain alive and that we do not lose sight of the aim to educate informed, aware, and responsible citizens at multiple levels: local, national, and supranational.

The results of ICCS 2022 are useful to have a better understanding of what is currently being carried out in Italian schools and of the possible needs with reference to CCE and to the theme of sustainable development, also in the light of the various initiatives and actions proposed at international level (UNESCO, 2017; 2020), and at national level (Law 92/2019).

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**Keywords:** IEA ICCS 2022, Civic and citizenship education, Sustainable Development, Teaching and learning activities

# SESSION 11. DATA AND DIGITAL LITERACY FOR SCHOOL SELF-EVALUATION AND IMPROVEMENT

ORGANIZER: INVALSI

COORDINATOR: LETIZIA GIAMPIETRO

DISCUSSANT: SERAFINA PASTORE

19 OCTOBER: 11 AM -1 PM {ROOM 3 – TEACHING 11}

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## School Dropout and Implicit Dispersion in Self-Assessment Reports in a Sample of Schools in Campania

Paola Di Natale - Barbara Barbieri

**Introduction.** This paper aims to evaluate how INVALSI data are employed in schools with high dropout rates. Specifically, it seeks to verify, through the analysis of a sample of Self-Assessment Reports (referred to in Italian as RAV), the main focal points and objectives to counteract both explicit and implicit school dropout. Additionally, it examines whether schools in culturally and socially disadvantaged environments recognise the possibility—if not the necessity—of addressing these two issues.

**Objectives and Hypothesis of Research.** The aim of this research is to explore the relationship between explicit and implicit dropout as depicted in Self-Assessment Reports from various schools in Campania, where early school leaving is prevalent.

The limited studies on implicit dropout suggest it predominantly affects students at high risk of marginalisation and social exclusion. These students, who often have fewer competencies, are likely to struggle more with processing available information and making choices consistent with their life plans. Building on this, the authors seek to evaluate the data on explicit dropout, the results of the INVALSI tests—as reported in the Self-Assessment Reports—and the long-term objectives and measures implemented by the schools.

**Data and Methods.** Initially, a sample of schools will be selected based on the monitoring of explicit dropout performed by the Ministry of Education (Ufficio Scolastico Regionale per la Campania) since 2022. The Self-Assessment Reports of these schools will then be examined, with specific reference to the area “Results of the national standardised tests” and the identification of main themes, process targets, and objectives.

**Expected Results.** This paper is an empirical study focused on a small area and a limited number of schools. However, it aims to contribute to the understanding and utilisation of INVALSI data, and to the examination of the relationship between social exclusion, school dropout, and implicit dispersion.

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**Keywords:** Early school leaving, Educational fragilities, Priorities for improving, Learning outcomes



## Promoting shared leadership: a reflection tool for the learning school

Francesca Storai - Serena Greco - Alessandra Silvestri - Sara Mori

Introduction. Shared leadership at school represents an innovative and effective approach to promote an inclusive and dynamic environment through the involvement and participation of all stakeholders in the educational community: school leaders, teachers, non-teaching staff, parents and students, which, through a culture of collaboration and sharing fosters informed and proactive decision-making (Lambert, 2002; Printy & Marks, 2006; Imam & Zaheer, 2021). The paper aims to present a reflection tool used within the Shared Leadership for the Learning School project, set up by Indire in 2022

Theoretical framework. The international literature related to the topic of leadership (Spillane and Orlina, 2005, 2012; Hargraves and O'Connor, 2018) has provided models and frameworks that have driven research and investigations that have taken turns over time in order to deepen the effectiveness of the relationship between the school leader and the various stakeholders and guide the school's design actions toward improvement. The dominant approach since the 1980s has been that of transformational leadership (Bass, Avolio, 1993), which aimed primarily at overcoming a directive logic in favor of a perspective more attentive to the needs and motivations of teachers and students. The goal was mainly a transformation of the context by the various school actors through the sharing of a common vision and mission. This model, through its emphasis on collaboration and discussion, laid the foundation for the development of another approach: shared leadership (Pearce and Conge, 2003). The underlying idea is that of a learning community by leveraging collective empowerment and self-efficacy to foster shared forms of leadership in responsibilities and actions (Harris, 2003; Leithwood & Mascal, 2008; Hallinger & Heck, 2010; Paletta et al., 2015). Shared leadership is widely regarded as an alternative to more traditional forms of school governance, as the school leader does not make most decisions alone, but together with other actors in the school or community (Hopkins, 2007). The definition of shared leadership that was considered most relevant to the project activities developed in the experiment with schools was Pearce and Conge's (ibid., p.1) "A dynamic, interactive influence process among individuals in groups for which the objective is to lead one another to the achievement of group or organizational goals or both. Leadership is broadly distributed among a set of individuals instead of centralized in the hands of a single individual who acts in the role of a superior."

The Shared Leadership for the Learning School project. The "Shared Leadership for the Learning School" research project aims to explore the concept of shared leadership within educational institutions as a lever of change in processes of improvement and focus on inclusion. Started in 2022, the project aims to:

- To experiment with a participatory school governance model through the recognition, enhancement and dissemination of shared leadership practices.
- To promote nonformal intermediate leadership roles by also involving students, parents and other stakeholders in the area. In particular, it is intended to promote youth led actions i.e., actions of active participation of students in decision making in the school.
- Promote collaboration and sharing to improve the whole-school climate and teacher and student satisfaction.

Twelve schools of all levels, selected by INDIRE through a comparative procedure, are actively participating in the project. Each school has established an internal Project Operations Group, which participates in both in-person and online training sessions, and collaborates with the INDIRE research team to define a governance model and co-design tools and guidelines. The comparison and documentation of shared leadership practices between the involved educational institutions and INDIRE researchers is a relevant aspect of the process, enabling mutual learning and further reflection on the strategies adopted. The research is characterized as training research, in that it includes training and accompanying actions to foster change within the organization. The methodology adopted is a mixed methods approach that integrates quantitative and qualitative methods. Different data collection

tools were used, including focus groups, questionnaires addressed to principals, teachers, and self-assessment tools.

A tool for supporting unified and shared design. Within the project, the INDIRE researchers proposed a design model for the development of shared leadership, based on data and analysis from the existing situation within the school organization. The model promotes a conception of leadership that encourages the active participation of every individual in the management and improvement of the school. From this perspective, the school is seen as a system in which the parts are interdependent: a change in one part of the system affects everything else, impacting all elements of the school. The design framework is inspired by the Multilevel Systems Models (I-M-O-I), which highlight how the results of a team are the product of complex interactions at the individual, group, and organizational levels. The proposed model invites the identification of critical issues and strengths at three main levels of analysis of the school organization: at the micro level, attention is placed on the individual development of students and teachers, i.e., on the opportunities offered for the development of skills and the sense of security and trust; at the meso level, attention is focused on the staff, and on how objectives are shared, the sense of belonging is fostered, and a proactive attitude towards innovation and creativity is promoted as key elements of the vision; at the macro level, reflection is required on how the entire school organization collects the educational needs of teachers, improves project capacity, and strengthens the culture of participation and stakeholder engagement. The reading of each level is interconnected: for this reason, actions considered crucial for the development of shared leadership that concern the daily actions of the Principal, teachers, students, families, and the community are subsequently reported. The staff is asked to reflect on which of these actions are already practices in use at the school and deemed sufficiently good, which are active and need improvement, which are not active and could be activated, and which are not foreseen. Considering these two steps, the school is asked to design actions for improvement, consistently with what is provided in the PTOF with particular attention to the themes of well-being and collaboration, school-family-community communication, and youth participation.

The school's experience. The school, a secondary school in the center of Italy, participates in the project with a group of no. 4 teachers in addition to the school headmaster and will present the path developed in the project. The dimensions in which the most critical issues emerged are as follows:

- Establishing, maintaining and supporting a culture of research, experimentation and innovation
- Creating and managing systems for the collection and exchange of knowledge and learning

The Project Operations Group has decided to take action on both of these areas. The school is actively working to promote a culture of mutual learning and effective collaboration among its faculty through various initiatives aimed at fostering the sharing of knowledge, experience and best practices both within and across departments. First and foremost, there is a focus on shared planning, which involves the active involvement of faculty in decision-making processes and the definition of activities. Another key strategy has been the implementation of interdisciplinary projects involving multiple departments. These projects not only encourage collaboration among teachers, but also allow complex issues to be addressed in an integrated and innovative way. In addition, the school promotes interdepartmental mentorship, allowing more experienced faculty to share their expertise and guide colleagues on their professional journey. Structured and regular meetings provide an additional opportunity for interaction and collaboration. To further facilitate collaboration, the school uses digital platforms, which allow faculty to share resources, documents and ideas quickly and effectively. Finally, the school recognizes and rewards collaborative efforts through incentives, recognition, and professional development opportunities, improving the engagement and active participation of all staff.

In addition, the school promotes interdepartmental mentorship, allowing more experienced faculty to share their expertise and guide colleagues on their professional journey. Structured and regular meetings provide an additional opportunity for interaction and collaboration. To further facilitate collaboration, the school uses digital platforms, which allow faculty to share resources, documents and ideas quickly and effectively. Finally, the school recognizes and rewards collaborative efforts through

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**Keywords:** Shared leadership, Learning organization, Tool

## INVALSI data to improve the quality of teaching/learning processes in Italian and mathematics

Pompea Funiati

Introduction. This contribution intends to make known how an action-research process aimed at defining tools and methodologies for self-assessment/assessment of teaching renewal has developed within our institute in the disciplines covered by the national surveys (Italian and mathematics), innovation of learning environments, strengthening of learning in the logical-mathematical and linguistic area in line with the strategic documents of the PDM, RAV and PTOF and with Objective 4 of the 2030 Education Agenda, through progressive innovation of methodological and teaching skills of mathematics and Italian teachers and consequently the improvement of the learning levels of our students.

The departments of literature and mathematics, after the return of the Invalsi data which are below the national average, considered it important to integrate the results of the external evaluation of learning

with the internal one of the institute to plan improvement actions aimed at students and to teachers, improving the process of analysis and diagnosis for highly compromised areas and processes (inferential processes and data and predictions) through the design of interventions to improve the professional skills of teachers and, consequently, the raising of students' learning levels to a more equitable and inclusive school through innovative teaching paths and metacognitive evaluation activities.

In particular, the mechanism involved various work phases:

initial assessment: initial assessment of students' learning levels through the administration of parallel Italian and mathematics tests chosen from the Invalsi repertoire  
planning/implementation: identification of areas for improvement, planning and implementation of training interventions for students and teachers

final evaluation: exit survey and evaluation of the improvements obtained

In summary, the Italian and mathematics departments worked starting from the diagnosis based on the objective measurement of learning to improve the teaching/learning process, through the planning of actions aimed at identifying strengths and critical points with support and improvement.

The self-evaluation and results were used for improvement plans through appropriate strategies, therefore an evaluation for development purposes to make improvements to the processes/products with a view to educational equity within our institute

Object, objectives and research hypotheses. Promote the professional development of teachers responsible for basic learning, in order to achieve improvement in outcomes and processes and reduce territorial gaps, through innovative teaching paths and metacognitive evaluation activities.

Spread the culture of self-evaluation aimed at preparing plans to improve teaching and the curriculum with the introduction of innovative teaching paths through training interventions aimed at recovering skills.

Improve the correlation between the competence certificates issued by the school and those certified by Invalsi.

Develop a specific project (PDM) with actions necessary to improve the teaching/learning process in relation to innovative methodological and disciplinary aspects.

Improve the quality of teaching and learning, using different tools and spreading professional skills and best practices.

Trigger innovative actions in curricular teaching starting from the importance of standard measurement of learning that integrates and strengthens internal evaluation and the accountability system. Systematize the actions for the implementation of external evaluation and self-evaluation within the institute

Data used.

- qualitative and quantitative investigations
- structural verification tests
- analysis of Invalsi items
- educational and methodological path designed to help overcome the cognitive obstacles that students encounter in solving the items
- data from parallel tests
- QDR Invalsi for Italian and mathematics
- observation grids

Method or approach. The strategies implemented to develop and improve students' learning processes and eliminate gender differences for a fair and inclusive school have included the redesign of teaching starting from the results of the Invalsi tests but also:

- initial training of teachers who teach Italian and mathematics over the two-year period for the strengthening and improvement of professional skills on areas and processes defined on the reference frameworks of the QDR of Italian and mathematics with the acquisition of the skills necessary to carry out the analysis of the results standard tests and parallel tests in their classes and for the integration of external tests with their own assessments from a self-analysis perspective;
- administration of a parallel test in Italian and initial and final mathematics chosen from the Invalsi repertoire and planning of improvement actions to be included in the PDM based on the results that emerged in the initial survey

- carrying out training modules for the recovery of the major areas and processes compromised by the students for individual classes or mixed with level groups between different classes for the recovery and strengthening resulting from a careful analysis of the results obtained with the parallel tests
- use of innovative methodologies and didactic and methodological materials of Italian and mathematics made available by the Indire platform for the Territorial Differences project aimed at improving outcomes
- use of CBT tests to compare results thanks to IT tools
- dissemination of the work carried out by the Invalsi Commission to the teaching staff and stakeholders
- The achievement of the objectives of strengthening and strengthening the expected skills was verified through the administration of initial and final tests and the evaluation of the differences between incoming learning levels and outgoing learning levels, in order to evaluate the positivity of the path undertaken and of the working method adopted which subsequently saw the improvement of the results.

The analysis of the results made it possible to evaluate the positivity of the path undertaken and the method adopted and possibly to redesign the action for subsequent years.

The survey took into consideration the quantitative dimension (correct, acceptable and unacceptable answers) with the aid of calculation software. For the quantitative analysis, a worksheet was developed for grouping the areas of Italian and mathematics. The action research identified the highly compromised areas and processes on which to intervene with improvement plans where the students demonstrated greater difficulty.

Results or argumentation. Develop and disseminate an innovative self-evaluation system within the institute to improve teaching:

- which takes into account the results of the evaluation to prepare targeted interventions that include the improvement of the quality of the curriculum both from the point of view of contents and from a methodological and didactic point of view;
- which impacts the methodological and teaching skills of teachers by strengthening in-service training.

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**Keywords:** Self-evaluation, Evaluation, Improvement

## **INVALSI data and decision-making processes. The heuristic value of INVALSI data for the improvement of the quality of outcomes and for the realization of a virtuous circle in the decision-making processes of a learning School**

**Lucia Portolano - Lucia Schito**

Introduction. The increase in mass schooling does not correspond to a significant increase in the quality of results in the school population. In fact, many research shows that the knowledge and skills acquired by Italian students, coming out of the five-year paths, are not aligned with the requirements required by postgraduate studies and the world of work and professions.

Linking INVALSI data to the above evidence, now in the public domain, seems right since the interventions under the P.N.R.R. were by the M.I.M. aimed at combating the implicit school dropout (D.M. 170/2023), it can be obtained from levels 1 and 2 reached by the students in the ITALIAN, MATHEMATICAL and ENGLISH disciplines of the standardized tests.

I.T.E.T. Carnaro Marconi Flacco Belluzzi in Brindisi has also been the recipient of a grant aimed at motivational and learning support for the most fragile students at risk of abandonment or implicit dispersion. The funded project, called "Together for your future", was the pretext to analyze carefully the data returned to the school by the INVALSI Institute, relating to the school year 2022/2023..

The analysis made it possible to make a comparison between INVALSI data and school results, the synthesis of which was presented in the form of graphs and explanatory tables to the Teaching Staff. This action, coordinated by the school principal assisted by the figures of the system, in particular by the contact person for the evaluation, has stimulated in the Teaching Staff a process of reflection that will continue within the Departments in order to rethink curricular planning and teaching practice.

The goal that we intend to reach is to trigger a virtuous circle to implement effective decision-making processes, at all levels, for a continuous improvement of management strategies, management, organization and coordination of teaching and to improve the quality of student learning and outcomes in terms of outgoing knowledge, skills and competences.

The educational leadership represented by the School principal (with actual assignment and arrived for transfer on 01/09/2023) and the distributed leadership generated by middle management in order to combine the management and the teaching staff, can ensure the achievement of an efficient system organization, intentionally planned in the different stages and carefully monitored, aimed to improve outcomes.

The dialogue between the two authors, with different practical and professional experiences, has developed important thoughts and observations with unexpected and innovative implications in the development of this work.

Content, goals and research hypothesis. Characteristics of the I.T.E.T. Carnaro Marconi Flacco Belluzzi:

- location in southern Italy, in Puglia, in Brindisi;
- high risk of leaving school because of difficulties in the logical-linguistic and logical-mathematical disciplines;
- poor school results;
- standardized tests with high percentages at levels 1 and 2,
- a strong technical and technological vocation in the Nautical, Aeronautical, Economic and C.A.T.
- the majority of the teachers is stable and motivated;
- 70% of commuting students;
- low-medium socio-economic background;
- rapid changes in the School Management (as of this year the School Manager is effective).

Knowledge of the school context, of the target, of the needs of the stakeholders is relevant for the success of the change that has to be implemented, in the belief that this can create a close school-wide collaboration and added value for future generations. The employability of young people depends on

constant and pragmatic dialogue between schools and companies: there is a need to update skills, more work-oriented training and to increase the presence of women.

In order to reach this goal, seminars and focus groups have been organized to promote innovative potential in the governance level of the school that as a learning organization needs to collect information and data, internal and external, that processed and interpreted develop processes of self-reflection and self-assessment proactive and retroactive, triggering at the same time corrective actions. The goals to follow with the process of change initiated in the school are summarized in the following points:

- improve students outcomes by reviewing educational designs, encouraging educational assessment, and creating motivational and growth experiences based on learning in situation;
- foster a sense of belonging to the school community and the involvement of all stakeholders in the sharing of values and institutional mission through cooperative research-action, dialogue and mutual support and the exchange of data and information;
- promote the professional development of teachers, creating opportunities for knowledge aimed at teaching and methodological innovation, starting from the training needs of the target audience.

The hypothesis underlying the research initiated by the Institute can be traced back to the positive consideration of INVALSI tests by teachers and, consequently, by learners. In general, teachers reject INVALSI tests because they do not find them consistent with the activities they perform in the classes. Most likely, I am not aware of how the tests are built and do not know the competency targets provided by the legislation that represent a precise reference point for INVALSI.

To make to carry out a standardized test to the teachers means to allow them to test themselves in the answers and to investigate just those processes, which underlie the organization of the items, which could provide them with elements to modify the teaching proposals and the disciplinary design of the beginning of the school year.

The following areas will therefore be explored in the research:

- link between Grade 10 learning targets and Grade 8 test targets;
- dependence of the results of grade 13 on the didactic choices of the Teaching Staff and the Departments, also with regard to extra curricular training;
- remote monitoring of outcomes.

Data used. The following data from the INVALSI tests of the 2023 school year were used:

- Primary classes (III Secondary first grade - grade 8);
- Classes II (second secondary II - grade 10);
- Terminal classes (final year of secondary school - grade 13).

The quantitative and qualitative analysis of the INVALSI items has allowed us to identify the strengths and weaknesses and criticalities of the areas and processes. In relation to the latter, numerically very relevant, reworkings, synthesis and graphic representations were carried out which were then shared collegially.

In particular, the results of levels 1 and 2 have been isolated, and then summed together, for each grade, both for Italian and for Mathematics tests. Levels 1 and 2 represent the inadequate results, corresponding to the outgoing learning goals not achieved and on which to reflect. The same approach was used to analyze the data returned for the English test. The gap % in the competences in Italian or in Mathematics or in English by region, by geographical area and at national level emerged and this was the starting point of the reflection.

Method or approach. The Heuristic method was followed, according to which, during the first learning, the school used the external feedback or the INVALSI standardized tests because it posed the important challenge of improvement, avoiding self-referential actions. Focusing on the value of the data and on the need to give and receive feedback allows to know the distance from the objectives, provides the possibility of self regulating the teaching action and indicates strategies for improvement.

Results or argument. Everything was presented to the College for a first overview, also requested by the DS on the basis of tables rich in data and colored graphs. During the dissemination phase within the institute, the first considerations of the teachers on the possible motivations and causes of the results

obtained by the students emerged from the common reflection. There are some arguments. The percentage of students who obtained positive results in grade 8 continues to show acceptable levels also in the INVALSI tests of class II and the last year of grade II secondary. Conversely, the percentage of students who were already weak or very weak in grade 8 continues to present unacceptable results in grades 10 and 13, albeit with a few exceptions. The widespread leadership used by the new leadership motivated teachers who felt responsible and part of the change underway and this stimulated the learning of the organization so that the work of teachers could be the key to learning widespread organizational, participated and successful for the future journey of our young students. In this context, the head of the Institute is laying the foundations for creating an efficient, effective and self-reflective school system and initiating the symbiotic transition from evaluation to Plans and vice versa. It was necessary to review all the strategic documents of the school: PTOF, RAV and PDM. The innovative data will analyze and reflect on the results over the five-year period.

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**Keywords:** Organization, Learning, Feedback, School Improvement, Decision Making, Creativity

## Data & Digital Literacy for School Evaluation: a survey about competences useful for the self-evaluation of schools for the development of large-scale training courses

Miriam Mariani - Daniela Torti - Michela Freddano

Introduction. This contribution proposes the continuation of the research presented in the previous edition of this Conference (Freddano & Mariani, 2023), which starts from the consideration of the school evaluation process as a “data-driven process of inquiry and decision-making” (Ackoff, 1989; Mandinach & Gummer, 2016). Through the structure of the National Evaluation System of instruction and training, in particular through tools such as the Self-Evaluation Report (SER) and the Improvement Plan, a “systemic design” (Giuffrida, 2018) is encouraged. It involves the sharing of a large amount of data that allow decision-makers, in this case school organizations, to support their choices with a data-driven strategy and adequate planning. Such a strategic approach is feasible if the school has the characteristics of a “learning organization” (OECD, 2016) and promotes a “data culture” within it. It’s understood as: « [...] a learning environment within a school or district that includes attitudes, values, goals, norms of behavior, and practices, accompanied by an explicit vision for data use by leadership, that characterize a group's appreciation for the importance and power that data can bring to the decision-making process» (Hamilton et al., 2009, p. 46).

Nowadays, what makes this scenario feasible is the fundamental component of the specific competences that users of decision-making processes must have: Data Literacy, « [...] necessary to develop and support a data culture» (Knapp et al. in Hamilton et al., 2009, p. 34) and Digital Literacy, to know how to manage activities within digital environments. During the first research step, the integrated model “Data & Digital Literacy for School Evaluation” (Freddano & Mariani, 2023; 2024) had been elaborated, which is built from the integration of three different theoretical frameworks:

- an iterative inquiry model (Data Literacy for Educators, DLFE, Mandinach & Gummer, 2016);



- a digital learning environment model (Next Generation Digital Learning Environment, NGDLE, Brown et al., 2015);
- a list of competence indicators.

It consists of five stages, in each of which data are to be used for decision-making purposes. The development of the model made possible to identify, for each of the five process steps, five key aspects that include specific competences that people involved in self-evaluation activities, as well as the internal evaluation teams, should possess.

Subject, objectives and research hypothesis. After the desk research on the model, a quantitative study started with the aim of investigating three main topics: 1) Self-Evaluation; 2) Data & Digital Literacy; 3) Experience with external evaluation.

Method or approach and data used. An online survey was organized and is currently in progress, aimed at School Principals and the members of the Internal Evaluation Teams of the 158 Italian schools that have signed an agreement with INVALSI to carry out research and training activities on the subject of self-evaluation and external evaluation of schools.

Results or argumentation. This contribution focuses mainly on the second aspect concerning Data & Digital Literacy. What it is hoped to derive from this survey is an overview of the specific training needs for those who carry out the activities of the school evaluation process, through a data-based profiling of participants (clustering). Finally, it is planned to systematize the newly gained knowledge in order to define large-scale training courses based on the information provided by the survey. The first results will be presented at the conference, opening up an opportunity to discuss the opportunities for a competence-based approach in school evaluation processes from an integrated perspective of assessment and learning.

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**Keywords:** Data and Digital Literacy, Competence-based model, Learning Organization, Teacher Training, Data-driven process

# **SESSION 12. THE USE OF INVALSI DATA AND MATERIALS IN TEACHING - MATH 2**

**ORGANIZER: INVALSI**

**COORDINATOR: CLELIA CASCELLA**

**DISCUSSANT: STEFANIA POZIO**

**19 OCTOBER: 11 AM - 1 PM {ROOM 4 – TEACHING 12}**

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## **Improving the Teaching of Mathematics, a reflection starting from the data of national and international surveys**

**Lorella Carimali**

In an era characterized by rapid technological changes, international tensions, globalization, conditioning, and new social challenges, the teaching of mathematics plays a crucial role. It is no longer sufficient to teach abstract notions, theories, and procedures without considering the impact that this discipline has on our lives and the world around us, both from a technical point of view and from a civic aspect. Having a more or less powerful mathematical education could become a further factor of inequality. (Report by Sandra Pereira to the European Parliament on 14.11.2023 on reducing inequalities and promoting social inclusion in times of crisis for children and their families).

The need for a new approach to teaching mathematics. It is therefore fundamental to review the approach to teaching mathematics in order to adapt it to current needs and allow everyone to possess a powerful tool for active citizenship in a world where artificial intelligence will be increasingly present. Mathematics also allows us to develop as individuals, as mathematical thinking trains those human qualities that enable us to find our place in an ever-changing world." (Keith Devlin, "The Math Gene"). "Furthermore, conversational generative AI systems ('chatbots') are producing rapid and unexpected changes in our cognitive sphere, starting from each individual's sense and way of learning; thus they will inevitably change our learning processes too." (Luca Mari, 2024, "Dostoevsky's Artificial Intelligence: Reflections on the Future, Knowledge, Human Responsibility"). Students must be encouraged to process information critically, experiment, and develop critical thinking skills; mathematics can serve as a gym to enhance creativity and mental flexibility." (Lorella Carimali, "The Equation of Freedom: Mathematics is Key for Rebirth"). Such change requires a profound reconsideration of both the approach to teaching mathematics and assessment methods, particularly within technical and professional institutes (where math education is viewed primarily through a technical lens rather than cultural or personal development). Moving away from the established path, even partially, causes anxiety and disorientation, making it difficult to identify the direction to take. Moreover, many students in Italy and other countries struggle to meet the desired standards in this discipline. Data from Invalsi and OECD provide valuable opportunities to understand students' strengths and weaknesses and to identify possible work paths and effective strategies to improve math teaching.

Objectives of the Intervention. This intervention has several objectives, with the main one being to present and discuss a possible use of data from Invalsi and OECD to improve the teaching of mathematics. In particular, I will share the path I followed to develop a new didactic design that includes a revision of content, teaching strategies/methodologies, and evaluation methods that can meet the needs mentioned above. Specifically, I have linked the reflections I deduced from a critical and thoughtful reading of the data from national and international surveys and assessments with the results of research on the processes of teaching mathematics. In some cases, I started from the research results and looked for which of these had evidence of their effectiveness in the data.

Another objective of this intervention is to encourage teachers to develop a "data-driven" approach to improving their teaching and not fall "prey" to current educational trends. How many times have we used new approaches, even with the use of technologies, without reflection based on evidence of their actual effectiveness and especially their coherence with our teaching? Through the explanation of my path, which can serve as an example, I wish to invite teachers to rediscover and see themselves as "researchers," using data and information derived from scientific methods of result analysis as the

primary tool to improve their teaching practice. In such an uncertain and constantly changing world, acquiring the methodology of research and action is fundamental and allows teachers to respond more and more to changing needs, also fostering the development of our professionalism.

Main Themes. Question: "How can I/we design the teaching/learning activity of mathematics in the classrooms in light of the considerations expressed in the introduction?"

Let's try to answer by following the typical method of mathematics. First of all, we need to collect information and data, dividing them into accessory and fundamental. Where can we search and select them? We certainly have the ministerial guidelines available, but these do not offer us a practical translation in our classroom activity because they assume choices that must be linked to the specificity of the class, school, territory, and, not least, our way of being teachers. For this, the information we can deduce from national and international surveys comes to our aid. The first step is an analysis of the context in which we practice the profession and the starting point in comparison with other similar realities. We can consult the data from the Invalsi tests/surveys that are returned to schools through a reserved area where it is possible to view the students' results and compare them with those of other similar schools, thus obtaining a detailed picture of the situation of our school in mathematics, in a comparative key, also to identify strengths and areas for improvement, thus having precise information to plan targeted didactic interventions. Graphs and tables are provided. We can then move on to the analysis of our classes, answering, for example, the questions: "What result did the students of my former second-grade secondary school class achieve in the test carried out in the last year of secondary school? Are there students in my classes at risk of fragility because they do not reach the goals set for the fifth grade of secondary school?" In this way, we have useful information that allows us to have a very detailed picture of what the students have or have not achieved in terms of skills and if they have stopped at a certain level. Furthermore, we can realize more precisely which areas of our didactic intervention have been effective and which allow for improvement margins. Regarding the content, on which areas is it worth insisting? Moreover, we can also ask ourselves if my evaluation corresponds to the evidence of the test results, where there is concordance and where there is discordance?

To gather information on possible paths for improvement and didactic innovations, we can read the data from national and international surveys in a comparative key, that is, see in those countries that achieve the best results what didactic approach to teaching mathematics is followed and if these approaches coincide with the evidence from research.

For example, we notice several critical issues:

Regional disparities:

- School dropout rates the school dropout rate in Italy is still too high, especially among students from disadvantaged socio-economic backgrounds. Mathematics is one of the subjects in which students encounter the most difficulties, and this can be a factor contributing to school dropout.
- Lack of motivation Many Italian students are not motivated to learn mathematics and experience anxiety. This can be due to a series of factors that the data analyze.
- Specific problems related to learning certain mathematical topics, such as geometry and statistics. In some schools, there is an excessive focus on Invalsi tests, to the detriment of a broader and more comprehensive didactic approach. This can lead to "mechanical" teaching aimed at passing the test, rather than developing mathematical skills that are truly useful to students.

From this evidence, I deduced that the main problem in the process of teaching and learning mathematics is not content-related but motivational and cognitive. Therefore, the didactic planning had to be revised based on these considerations. At this point, I went back to the research in these fields and came up with some initial considerations.

After understanding what to act on, we can ask ourselves how to act on cognitive and motivational aspects and what actions to take. From the analysis of international surveys, such as OCSE PISA2022 (<https://www.oecd.org/publication/pisa-2022-results>), we observe that we do not have significant differences in content domains compared to other countries, reconfirming previous considerations, but we do have differences in cognitive domains. Furthermore, the 2022 surveys confirm the power of emotional intelligence. Social and emotional skills play a critical role in children's development, fostering their growth as well-rounded individuals. They show that social and emotional aspects are also correlated with students' performance in mathematics. "On average, in OCSE countries, students who were curious or persistent scored about 11 points higher in mathematics. Students who were better

able to control their emotions or were resilient to stress also outperformed their peers by about six points. The results highlight how cognition and emotion are intertwined ingredients of academic success. In 18 countries and economies, more than 60% of 15-year-olds are low performers in all three subjects. This is not the case for everyone. Students in Singapore can effectively work with mathematical models for complex situations, understand abstract texts, and interpret and evaluate complex experiments. Singapore ranked first in mathematics, scoring 575 points. These results suggest that, on average, students in Singapore are equivalent to nearly five years of education ahead of their peers who score the OCSE average of 472 in mathematics. It is noteworthy that this impressive educational performance occurred in a relatively short period. Older adults in Singapore, assessed separately by the OCSE, perform much worse compared to younger generations. While the overall direction of global educational performance is mainly declining, some countries and economies have defied the trend.” Therefore, if we analyze the Singapore method<sup>7</sup>, we notice that the Singapore method stands out for an innovative pedagogical approach that places the student and their learning process at the center, with key elements such as: a CPA (Concrete-Pictorial-Abstract) approach, emphasis on problem-solving, development of metacognition, collaborative approach, high-quality teaching materials, and the central role of the teacher.

Connecting reflections on data with scientific research, we can think about working on:

- developing meta-reflection
- teaching mathematics through different approaches, tools, and representations
- emphasizing the role of verbal language as an essential form of thought to explain mathematical meanings
- focusing on problems rather than exercises at different school levels, allowing adequate time for reflection and group discussion on different solving procedures and their comparison
- always asking to explain the why, even when using a formula or applying a procedure, inviting to rephrase in different ways, modifying explanations to be understood, self-evaluating and evaluating, being critical and demanding without judging (mathematics is democratic: it must become the place of responsibility, dialogue, and reasoning)
- viewing mistakes not as failures but as resources to reflect on to find another solving path and/or new knowledge
- breaking down gender stereotypes
- Designing activities that develop the abilities to intuit, imagine, design, deduce, and control phenomena in mathematics by actively involving each student
- Working on different representations of mathematical concepts (graphic, analytic, algebraic...), starting from examples and returning to examples and counterexamples, explaining the whys (abstraction is a process, definitions, formulas, properties are an endpoint, not a starting point)
- Always keeping in mind the dual cultural and instrumental value of mathematics.

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<https://www.singaporemath.com/pages/what-is-singapore-math>,  
<https://singteach.nie.edu.sg/2009/09/01/issue20-mathed/>,  
<https://risorse.arcipelagoeducativo.it/percorsi-tematici/metodo-singapore-la-matematica-a-misura-di-bambino-e-di-bambina> and institutional sites

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**Keywords:** Artificial intelligence, Mathematical education, Gender differences, Mathematics curriculum

## **Standardized mathematics assessments for the training of teachers and future secondary school teachers: reflections on the “three-fold meta-didactical conflict”**

**Serena Monica**

**Introduction.** In this work we present a research focused on the presence of the "three-fold meta-didactical conflict" (Arzarello & Ferretti, 2021, Ferretti, Vannini & Arzarello, 2022), a meta-didactical conflict that involves the relationship between Italian teachers and large-scale mathematics assessments. In particular, the research we will show involved teachers and future teachers of secondary schools. Starting from the results of the literature that highlight the three-fold meta-didactical conflict in the primary school context, the study was developed aimed at investigating the presence and characteristics of the three components of the meta-didactical conflict (perception of the difficulty of the questions, awareness of the causes of errors, perception of the purpose of the questions). In detail, these components were further theoretically framed within the MTSK Model which outlines specialized knowledge for mathematics teaching (Carrillo-Yañez et al., 2018). This study therefore fits into the line of research that sees data from large-scale evaluations as tools that can be used in the field of teacher training, to improve teaching and learning processes (Bolondi et al., 2019, Ferretti, & Bolondi, 2019).

**Research object and hypothesis.** The research object is the "three-fold meta-didactical conflict", a construct defined at the level of primary school teacher training by Arzarello and Ferretti (2021). This conflict arises from the comparison between the context of a mathematics class and the general national school context and, as the name suggests, is divided into three components concerning the discussions on teaching processes understood as evaluation, students' skills and errors and not like mathematical concepts. In particular, the focus of the project is teaching in upper secondary schools. Our research, therefore, arises from the desire to find the presence of the three components of the conflict: perception of the difficulty of the questions, awareness of the causes of errors, perception of the purpose of the questions, in a mixed sample of teachers in training (master's university students and doctoral students in mathematics education) and in-service teachers. Some proposed questions aim to delve deeper into the first component, starting from the hypothesis that many teachers perceive the difficulties of the INVALSI mathematics tests differently from the results actually recorded at a national level. Other questions concern the second component, i.e. the teachers' identification of the possible causes of the errors found in the tests. Finally, the third component is characterized, a consequence of the previous two, inherent to the contradictory way in which teachers interpret the purpose of the INVALSI questions. The objective of the research is, therefore, to highlight the presence of possible critical issues at the level of specialist knowledge, to define any corrective interventions on the training of secondary school teachers.

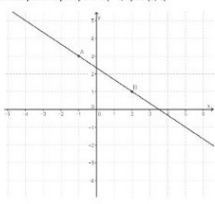
**Data.** The research was born from a sample of around sixty interviewees, made up of around twenty future teachers, including some master's degree students in mathematics on the teaching path and other PhD students in mathematics education and around forty in-service teachers, from new hires to teachers with more than fifteen years of experience. The sample is mainly composed of people from the provinces of Ferrara, Bologna, Bari and Trento, of working age.

**Method.** The work begins with the identification, with the GESTINV platform, of eight INVALSI grade 10 questions, useful for the analysis of the starting hypotheses. In particular, four questions (D21 year

2017, D15 year 2011, D28 year 2010, D5 year 2016) are the basis of the research on the first component of the three-fold meta-didactical conflict, of which two respectively with a percentage of incorrect answers greater than 60% and two with a percentage of correct answers greater than 55%. The remaining four questions (D22 year 2011, D14 year 2011, D14 year 2013, D24 year 2017) form the basis of the survey relating to the second component and have a percentage of correct answers of less than 35%. Each question is followed by targeted, mixed, open-ended and closed-ended questions on a Likert scale from 1 to 4 (without central point), some of which are constant for the investigation of the third component. We anonymously administered, with Google Forms, the questionnaire divided into two main parts: one aimed at contextualising the interviewee through age, province of origin and career; the other composed of questions aimed at investigating the three components of the meta-didactical conflict. We offer an example of the section intended for in-service teachers to clarify the methodology used.

Secondo te, quanto è difficile il seguente quesito per degli studenti alla fine della classe seconda della scuola secondaria di secondo grado?

D21. Considera la retta passante per i punti A (-1; 3) e B (2; 1).



La pendenza (o coefficiente angolare) della retta AB è

A.   $\frac{3}{2}$

B.   $\frac{2}{3}$

C.   $-\frac{2}{3}$

D.   $-\frac{3}{2}$

1 2 3 4

facilissimo ○ ○ ○ ○ difficilissimo

---

Su una scala da 1 a 4, quanto ritieni che questo quesito sia idoneo a valutare gli apprendimenti di studenti al termine della classe seconda della scuola secondaria di secondo grado?

1 2 3 4

pochissimo ○ ○ ○ ○ tantissimo

---

Su una scala da 1 a 4, quanto abitualmente utilizzi quesiti come questo nelle tue prove di valutazione?

1 2 3 4

pochissimo ○ ○ ○ ○ tantissimo

---

Considera questo quesito INVALSI proposto alle classi seconde della scuola secondaria di secondo grado.

Il 21,1% degli studenti ha risposto correttamente scegliendo l'opzione C.

Secondo te, qual è l'opzione/le opzioni sbagliata/e più scelta/e e perché:

D22. Il polinomio  $x^4 - 16$  è divisibile per

A.  $x^2 - 8$

B.  $x - 4$

C.  $x + 2$

D.  $(x - 2)^2$

Testo risposta lunga

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Su una scala da 1 a 4, quanto ritieni che questo quesito sia idoneo a valutare gli apprendimenti di studenti al termine della classe seconda della scuola secondaria di secondo grado?

1 2 3 4

pochissimo ○ ○ ○ ○ tantissimo

---

Su una scala da 1 a 4, quanto abitualmente utilizzi quesiti come questo nelle tue prove di valutazione?

1 2 3 4

pochissimo ○ ○ ○ ○ tantissimo

Figure 1: Example questionnaire question for teachers

The closed-ended question "In your opinion, how difficult is the following question for students at the end of the second year of secondary school?" serves to deepen the interviewees' perception of the difficulty of the questions. The open-ended question "In your opinion, which option(s) is the wrong choice(s) the most and why?" it is useful for analyzing the level of awareness of the causes of errors. The questions "On a scale of 1 to 4, how suitable do you think this question is to evaluate the learning of students at the end of the second year of secondary school?" (for prospective teachers and teachers) and "On a scale of 1 to 4, how often do you use questions like this in your assessment tests?" (for teachers) have the purpose of defining the degree of perception of the purpose of the questions. We initially analyzed the INVALSI questions with the theoretical lenses inherent to the didactical contract (Brousseau, 1986), the management of representations (Duval, 1993) and misconceptions (D'Amore B. & Sbaragli S., 2005). We subsequently compared the data collected with the MTSK model (Carrillo-Yañez et al., 2018).

Results. The results of the analysis appear to be generally in line with the hypotheses. As regards the first component of the three-fold meta-didactical conflict, both teachers in training and those in service perceive the difficulty of the questions proposed differently compared to the response percentages analyzed at a national level. Below we propose an example relating to the results of question D21.

Secondo te, quanto è difficile il seguente quesito per degli studenti alla fine della classe seconda della scuola secondaria di secondo grado?  
44 risposte

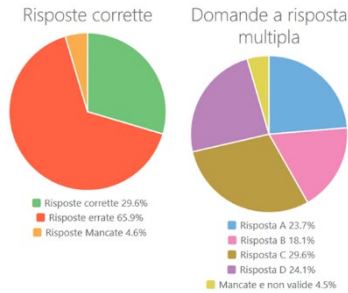
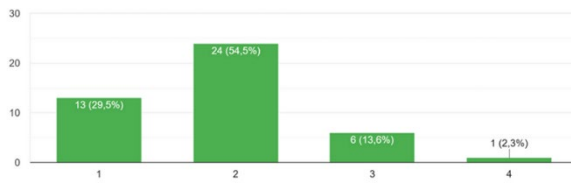


Figure 2: comparison of questionnaire results and INVALSI results for question D21

Similarly, the results relating to the second component of the meta-didactical conflict denote, in some cases, a partial awareness of the causes of student errors. We present an example with question D14 from the year 2011, where the tendency of the respondents is for distractors B and D.

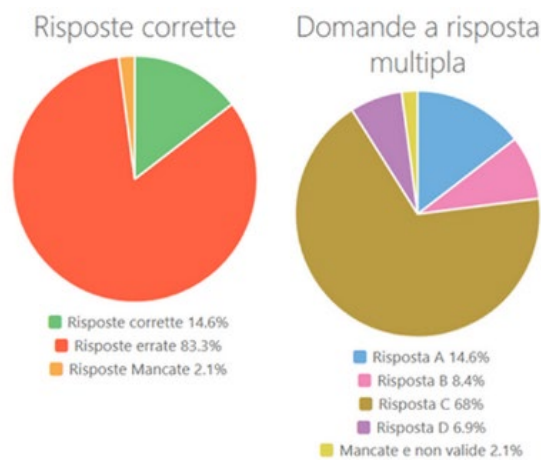
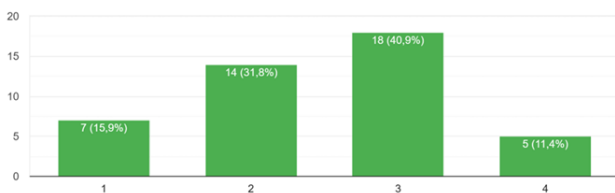


Figure 3: results relating to question D14 year 2011 (GESTINV)

The third component of the conflict is the subject of significant results: in-service teachers sometimes do not use the INVALSI questions as an effective evaluation tool, despite realizing their effectiveness. We show the results obtained in question D14 of the year 2011.

Su una scala da 1 a 4, quanto ritieni che questo quesito sia idoneo a valutare gli apprendimenti di studenti al termine della classe seconda della scuola secondaria di secondo grado?  
44 risposte



Su una scala da 1 a 4 quanto abitualmente utilizzi quesiti come questo nelle tue prove di valutazione?  
44 risposte

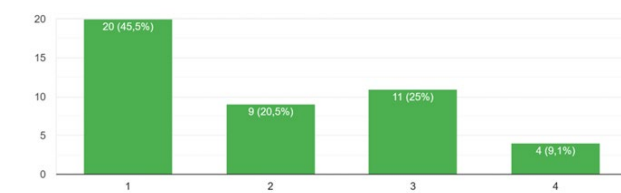


Figure 4: example of results of the third component of question D14

In conclusion, we observe the presence of all three components of the three-fold meta-didactical conflict in the sample of interviewees. These results, sometimes more evident among in-service teachers, represent an interesting starting point for improving the quality of secondary school teacher education.

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**Keywords:** Teacher education, Secondary school teachers, MTSK model, Mathematics, GESTINV

## **Formative assessment, non-routine problems and diagrams for the development of geometric proficiency in mathematics**

**Clara Dughera - Francesca Ferrara - Giulia Ferrari - Ketty Savioli**

Introduction. In this contribution, we present some reflections emerging from experimentations of activities conducted in several grades, from kindergarten to grade 8. The activities involved all begin with a visual stimulus, a *diagram*, for *non-routine problem* solving. By diagram we mean a type of inscription, a visual 'tool' that organizes space and articulates relations in a given way. In short, a diagram captures certain spatial relations, which characterize it as such and constitute the mathematics it incorporates: relations between figures (e.g., a square and, within it, a second square rotated by 45 degrees), relations between geometric elements (e.g., the midpoint of a segment), but also numerical relations (e.g., the ratio between the area of one figure and the area of another figure). For Bender and Marrinan (2010), diagrams function both as representations and objects situated in the world of the observer. A diagram is not just an image: it fails to position a viewer in one designated or legitimate location from which to observe, rather it invites a more *active*, perceptual, visual and sensorimotor engagement to be interpreted. From the perspective of mathematics education, non-routine mathematical problems centered on diagrams are interesting precisely because of this type of engagement, which places the student at the center of the learning process.

Blum and Niss (1991) defined a non-routine problem as "A situation which carries with it certain open questions that challenge somebody intellectually who is not in immediate possession of direct methods, procedures, algorithms, etc. sufficient to answer the questions" (p. 37). Thus, the situation requires that the problem-solvers adapt, combine, or invent new strategies for finding a solution (Schoenfeld, 1994, 2008). An interesting feature of non-routine problems is that they imply *strategic thinking*, one of the crucial 21st century skills required of conscious citizens.



Research object and hypothesis. Our reflections are placed in this perspective, *between* mathematics didactics and formative assessment. Non-routine problems, indeed, recall the *non-standard situations* in the framework of the new formative assessment for primary school in Italy. Even the framework of the IEA-TIMSS surveys, to evaluate *reasoning* processes, considers beyond routine problem solving that of *unfamiliar situations*, complex contexts and problems requiring multiple steps (Mullis et al., 2017).

We believe that non-routine mathematical problems that make use of diagrams make it possible to work on the construction of geometric proficiency in such a way that learning is not (only) executive and repetitive, i.e. not only procedural, but also, and above all, *conceptual* (e.g. Sfard, 1991; Arcavi, 1994). They can therefore become, by their very nature, significant tools for assessing a conceptual proficiency in geometry, which is not limited to mere knowledge. On the other hand, the national assessment tests by INVALSI often present diagrams as a starting point for their items in the *Space and figures* domain, especially when they intend to assess a proficiency not strictly linked to the application of rules, formulae and procedures but based on a conceptual understanding involving mathematical relations, aimed more at the ability to reason, to solve problems and to argue (hence at the 'know how' in mathematics).

Used data. In this contribution, on the one hand, we analyze a close-constructed response item (D14) from the *Space and Figures* domain that was part of the 2017 national assessment in grade 5 and its results, in order to reflect on its value from the perspective of both formative and standardized assessment. At the time of the test, the item was very difficult, returning a very small percentage of correct answers, 22.5%.

On the other hand, we consider answers and solving processes that emerged when dealing with non-routine problems focused on the use of specific diagrams in primary school classes. Finally, we discuss concrete examples of the type of strategic and argumentative thinking that can be stimulated by teaching emphasizing this type of problems and that was used in answering the above-mentioned item by grade 5 students.

All the problems we refer to were used in our experimentations and offered in the context of two training courses in which kindergarten to middle school mathematics teachers took part in the Method. Concerning item D14, in particular, we analyze the indices returned by the analysis of the results of the 2017 national assessment of mathematics in grade 5, including the goodness of the question, its discriminativeness, its characteristic curve (which relates the probability of a correct answer and the ability shown by the students in the test) and the percentages of correct, incorrect and missing answers. The characteristic curve shows a particular behavior, which we can interpret as an 'inverse' behavior to that expected: students with higher ability show a lower probability of answering correctly than the less able, rather than the opposite. Concerning the examples from the classrooms, we analyze the answers given both to non-routine problems, during the experimentation of these problems, and to item D14, after the experimentation. Above all, we see how the solving approaches to the item are characterized by strategic thinking and the search for relations between figures, not so much by measuring the length of sides or segments to make calculations (thus revealing a non-procedural approach).

Results. Our study focuses on the geometric proficiency that it is important to build in mathematics education at all school levels, with particular emphasis on reasoning, problem-solving and argumentation processes aimed at conceptual and not just procedural understanding. Both mathematics education research and the national and international assessment frameworks help to provide tools to address this wide-ranging issue.

Using the data collected through our experimentations, we have observed how non-routine problems that make use of diagrams to work on geometric thinking provide useful resources for stimulating the construction of strategic thinking in geometry. They consequently provide tools for a more dynamic approach also to the process of solving items from the *Space and figures* domain, which involve the ability to understand and work with mathematical relations in a given context (provided by the diagram).

Mathematics education centered on diagrams appears powerful both with a view to conceptual and not just executive learning and with a view to developing a culture of formative assessment as assessment for learning.

The group that took part in the training courses and developed the experimentations discussed here also consists of: Sara Bianchi, Marina Gilardi e Maria Luisa Sattin (*Istituto Comprensivo Chieri III, Chieri, Torino*).

**Keywords:** Mathematics education, Geometric thinking, Non-routine problems, Relations, Formative assessment

## **A vertical perspective to bring out different resolution strategies: evidence from the INVALSI mathematics tests**

**Margherita Righi - Camilla Spagnolo - Giorgio Bolondi**

From an increasingly accentuated vertical curricular vision comes the desire to identify the different solution strategies implemented by children of different age groups when faced with the same mathematical problem from the INVALSI National Tests.

In the context of the Kindergarten School, one does not really speak of the discipline 'mathematics', but refers to what are defined within the *Indicazioni nazionali per il curricolo* (MIUR, 2012) as “campi di esperienza”, which contain learning objectives and goals related to the concepts of number, calculation, data, logic and solution strategies. These aspects, with a view to verticality, are then taken up and deepened in the mathematical field in Primary School.

In all learning processes, thus including mathematics, a laboratory-type part should be included, where the children has the opportunity to experiment and use different strategies (Lognoli, Provitera, Saponaro & Spagnolo, 2022). This aspect is also strongly emphasized in the *Indicazioni nazionali*, where the importance of fostering moments *in which the pupil is active, formulates his own hypotheses and checks the consequences, plans and experiments, discusses and argues his own choices, learns to collect data is stressed* (translation provided by the authors, MIUR, 2012, p. 49).

Taking what has just been mentioned and the figure of Emma Castelnuovo as a reference point in view of concrete experiences in mathematics (Arzarello, Bartolini Bussi & Bazzini, 2013), it was decided to design a problem-solving activity based on an INVALSI item to be proposed to five different age groups, starting from four to eight years old.

To identify the problem, a guided search was conducted through the Gestinv database (accessible at [www.gestinv.it](http://www.gestinv.it)). The chosen question is taken from the Invalsi Mathematics Tests for Grade 2 of the 2008-2009 school year: "John buys boxes of pencils like this. He has a total of 18 pencils. How many boxes did he buy?" (translation provided by the authors).

The text of the question was particularly significant for the different school grades in which the activity took place, as it allowed it to be narrated to the children with the support of the materials mentioned and depicted in the item, thus realizing a *dramatization* of the situation. During the implementation of the activity, the text was only modified in the part concerning pencils, which became markers due to a question of material availability.

With the participation of a pre-school section and three primary school classes from the Trentino region, the activity was then implemented, involving a total of five groups: a group of four four-year-old children, one consisting of eight five-year-old children, a first class consisting of thirteen pupils, a second class of eighteen children and finally a third class with twenty participants. All the children were then divided into subgroups of four to five members each to facilitate the dialogue moments of the activity.

Regardless of the age of the children, the problem was introduced narratively, therefore narrating the text verbally and gradually illustrating the materials involved, thus obviating the direct and individual

reading of the item (Zazkis & Liljedahl, 2002). After that, for the two groups in the Kindergarten and first grade of the Primary School, a collective approach to solving was chosen, letting the various subgroups collaboratively find a solution to the question. For class two and class three, on the other hand, there was initially a part of individual solving, followed by a plenary discussion where each child was invited to illustrate his solving procedure to his classmates. At the end, all groups were asked to graphically represent the solution to the problem or the problem-solving process.

Thanks to the direct observation of the various groups, the audio recordings made during the plenary discussions and the graphic works produced by the children, numerous aspects emerged, which were analyzed and divided into unexpected responses, different strategies for using the materials and graphic representation tools. The concept of unexpected response is outlined by Bruno D'Amore (2013 and 2014) and includes all those responses that could be defined as non-standard, which do not fall into the category of expected responses.

A first example of an unexpected answer that emerged from the performance of the activity is that of a girl who represents both graphically, through the literal drafting of the answer accompanied by a written calculation, and also in the oral narrative, a problem that is totally alternative to the one narrated. In her graphic work, a drawing appears of a little girl named Anna who possesses two pencil cases, one with five markers inside and one with ten. Through the calculation  $10+5=15$  shown at the edge of the page, we therefore can deduce that the implicit question in her problem was to identify the total number of pencils owned by the protagonist. This case shows how the reasoning and supporting calculation is correct, but does not correspond to what was requested in the presentation of the activity. A second case of an unexpected answer emerged from another pupil who chose to represent the answer to the question by drawing a box containing twelve markers on the paper. During the plenary discussion, the pupil explained that she had understood using the materials placed on the table that six markers fit into the box. Not knowing where to put the remaining twelve, she decides to represent them graphically in a box with her name on it. This resolution strategy is divergent from what one might expect, but at the same time provides a well-founded explanation and logical reasoning.

All cases in which the students create in the graphic representation or in the oral discussion part a broader context to the narrated text by adding components not required or not mentioned in the item could then be included in this category. An example could be when the problem drawing depicts John, the protagonist of the story, holding a wallet, with which he ideally made the purchase of the markers and mentions orally the supermarket where these items were on sale.

A further aspect that emerged from the conduct of the activity in the various groups between pre-school and primary school relates to the different strategies for using the materials. In most cases in which the children used the materials placed on the table, the solution to the question arose by inserting the markers

inside the box, thus finding the "missing data". In some cases, however, the children implemented divergent strategies that led to the result of the problem in each case. Some, for example, used the box of markers not as a container but as a measuring instrument, using its surface or short side to check the number of markers it could contain. Another strategy used in all age groups was based on the color of the markers. Many children noted that there were three markers of each color, thus deducing that there were originally three boxes of markers. A further distinction emerged regarding the use of the materials provided: in the first three age groups there was an almost immediate approach to the materials, whereas the older the participants got, the more there was a need for confirmation by the teacher.

Graphical representations can instead be associated with the concept of a "teaching contract". In the second and third primary groups particularly, a precise problem-solving structure emerged, consisting of a data collection part, a subsequent calculation and a concluding answer. It was not a methodology adopted by all the pupils, but in those cases where it was present, it was associated with a previously learned standardized solving process. In some cases, however, the children chose to represent the answer directly in a drawing, most often depicting the three boxes containing six markers each, or a single box containing six markers. Other pupils, on the other hand, a priori according to their age group,

used the graphic representation as a support for logical reasoning, for example by representing the eighteen markers and subdividing them through a set process into three groups. Starting from the quantitative analysis that emerged from the results of the INVALSI Tests, the activity involving several vertical class groups made it possible to highlight the use of different strategies and different effects of the didactic contract with respect to the use of problem-solving strategies.

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**Keywords:** Vertical curriculum, Didactic contract, Solving strategies, Workshop activities, INVALSI tests

## **Participation in the problem solving olympiad (OPS) and results in the mathematics invalsi tests - grade 8: can stimulating the development of computational thinking as a general strategy for tackling problems improve outcomes in mathematics?**

**Carmina Laura Giovanna Pinto - Maria Lucia Colella**

The computer science project "Campionati Nazionali di Problem Solving" (hereinafter OPS), promotes key competences for problem solving through computer models, methods and tools and is aimed at pupils from primary school, lower secondary school and the first two years of upper secondary school. The competitions are intended, among other things, to stimulate the growth of problem solving skills and to foster the development and dissemination of computational thinking. On the other hand, the National Indications for the Curriculum state: 'Characteristic of mathematical practice is the solving of problems, which must be understood as authentic and significant issues, linked to everyday life....'. Problem-based teaching enables the structuring of a study method in which modelling and representations become tools for thinking and reasoning, and thus for meaningful learning. Many studies by researchers, such as those of Prof. Rosetta Zan, place problem-solving at the centre of mathematics education not as an outcome objective but as a process study, with particular attention to pupils' difficulties, problem solving, and teacher training.

The purpose of this research is to draw attention to a case study comparing the results of the INVALSI Maths Tests - grade 8 in the school years from 2015/16 to 2022/23 of classes that participated in the Problem Solving Olympiad in the seven-year period analysed - with a methodological approach in the teaching of mathematics, i.e. one that stimulates learning by research, modelling of reality and analysis by problems - with those of classes that did not participate in the Problem Solving Olympiad in the decade analysed. The research hypothesis is that any improvements in outcomes are correlated and more evident in classes where a methodological approach is adopted that is necessary to enable students to be ready to participate in the said Olympiads, an approach that, as recalled in the National Indications for the Curriculum, makes problem-solving and not just repetitive exercises, remembering a definition or a rule, a characteristic of mathematical practice.

Research object and hypothesis. This paper answers two interrelated research questions

1. can a methodological approach in mathematics education that stimulates learning by research, modelling of reality and analysis by problems, as proposed by the Problem Solving Olympiad, improve outcomes in the INVALSI Mathematics Tests?

2. Can providing opportunities for challenge through participation in competitions and olympiads that allow each student to see new opportunities for personal growth help improve personal and class outcomes in mathematics?

Data used. This case study - referring to a secondary school in the Marche Region - analysed the data of the INVALSI Maths Tests - grade 8 in the school years from 2015/16 to 2022/23 of the classes that participated in the Problem Solving Olympiad (sample classes) in the seven-year period analysed and the classes that did not participate in the same Olympiad (non-sample classes) in the same seven-year period. In this way, possible connections with improvements in performance in the INVALSI mathematics tests were highlighted.

Method. From the INVALSI mathematics data - Grade 8 from school year 2015/16 to school year 2022/23 will be extrapolated those of the classes that also participated in the Problem Solving Olympiad in the same years - and therefore followed a problem-based learning process - and those of the classes that did not participate in the same Olympiad in the same years.

Results. The aim is to analyse as a case study the data provided by a secondary school in the Marche region comparing the evolution in the results over the seven-year period from the 2015/16 school year to the 2022/23 school year in the INVALSI mathematics tests of the sample and non-sample classes and to test the research hypotheses.

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## Sitografia

Sito OPS <https://www.olimpiadiproblemsolving.it/web/index.php>

**Keywords:** Problem-based learning, Outcomes, Invalidity, Tests in Mathematics, Key competences

## **SESSION 13. KEY COMPETENCIES, TRANSVERSAL SKILLS AND CITIZENSHIP EDUCATION 2**

**ORGANIZER: INVALSI**

**COORDINATOR: VALERIA TORTORA**

**DISCUSSANT LAURA PALMERIO**

**19 OCTOBER: 4.30 -6.30 {ROOM 3 – TEACHING 13}**

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### **Students' Perceptions of Gender Equality, Immigrant Rights and Environmental Protection in the ICCS 2022 Survey**

**Francesco Annunziata - Pierangelo Grosso**

Introduction: Rights and Duties. The fight against various forms of violence, such as gender-based violence, requires a collective commitment to promote greater civic and civil awareness, in order to educate respect for differences and diversity. The resilience of democratic coexistence and the future of generations depend on everyone's adherence to this commitment. The school, in this context, assumes a crucial role as a privileged place to form the citizens of tomorrow, with the collaboration of all (Palmerio & Greco, 2023). For these reasons, it is important to monitor students' perceptions on crucial issues such as gender equality, immigrants' rights and environmental protection.

Purpose and research hypothesis. The ICCS 2022 national report presents an initial analysis of student perceptions on specific topics, showing an increase in interest in these topics compared to the previous cycle of the survey (ICCS 2016). The aim of this study is to deepen these analyses, with a focus on the Italian national context. Specifically, we aim to explore possible differences by gender and between different geographical macro-areas, as well as to study the relationships between students' perceptions and related activities carried out in the school context on these topics.

ICCS 2022 data. ICCS 2022 is the third cycle of the International Civic and Citizenship Education Study, sponsored by the IEA - International Association for the Evaluation of Educational Achievement. The aim of ICCS is to understand how young people are prepared to play an active role as citizens by analysing knowledge, attitudes and activities related to civic and citizenship principles. ICCS collects a wide range of data on the educational environment, including teaching methods, classroom management, school organisation and climate, and includes insights into Europe through the student questionnaire 'European Module' in some countries, including Italy.

ICCS is of significant importance as one of the indicators for assessing the achievement of Target 4.7 of the 2030 Agenda, focusing on education for sustainable development and global citizenship. This makes it a key source of data to monitor countries' progress in achieving quality, equitable, inclusive education and learning opportunities for all, as a broader goal of the fourth Target of the 2030 Agenda (Palmerio, Greco, 2023).

The sample is two-stage stratified: the first-stage units are the schools, stratified and extracted with probability proportional to their size; the second-stage units are all the students in classes extracted with equal probability within the school. The Italian ICCS sample is representative both nationally and by geographical macro-area (North West, North East, Centre, South, South Islands). In ICCS 2022 the Italian sample consists of 226 schools (of which 154 administered the test in digital format and 72 in paper format), 4347 students (of which 2945 took the test in digital format and 1402 in paper format) and 2121 teachers (digital only).

At the end of the cognitive test, students were asked to complete a student questionnaire and a student questionnaire 'European Module'.

In addition, contextual factors influencing student learning were measured by means of two questionnaires: one addressed to teachers of all disciplines and one to the head teacher of the sampled schools.

In ICCS 2022, context questionnaires collected information on how schools involve students in school life: school leaders and teachers were asked to indicate the involvement of students in various activities, including the design of educational offerings, the definition of rules and regulations, decisions on teaching content and planning of classroom activities, and participation in self-evaluation processes.

Methods and Expected Results. The Rights and Duties section of the student questionnaire focused on investigating students' attitudes towards equal rights. Students were asked to indicate their degree of agreement or disagreement (four-point scale from Strongly Agree to Strongly Disagree) on a series of statements regarding issues such as the inclusion of immigrants, gender equity in the social and labour context, the importance of actions to protect the environment and the perception of the rights and duties of different ethnic groups in society.

In addition, within the School and Teachers questionnaire, the headmasters and teachers of the sampled schools were asked to indicate the school's participation in various activities to raise awareness of human rights, social inclusion and environmental issues.

In an initial analysis of the results, different attitudes are observed between males and females regarding the different issues considered: gender equality, immigration, environment and social marginalisation of foreigners. Although both groups show overall support for the issues addressed, there is a significant difference in the way they express their agreement. The 'very much agree' responses register a higher percentage among females than males, indicating a greater propensity for girls to more strongly support the principles of equal rights.

As this difference may reflect differences in education, life experiences and cultural perceptions between the two groups of students, the aim will be to explore possible disparities also within the different geographical macro-areas.

In addition, it is intended to analyse differences between schools using available contextual data, assessing the impact of awareness-raising activities organised by schools also in collaboration with external bodies. This in-depth study could offer a more comprehensive view of the effectiveness of such initiatives in promoting greater awareness and understanding of rights and responsibilities in society.

Finally, since two of the four issues considered were already surveyed in ICCS 2016, it would be interesting to compare the results in order to identify any differences over time and assess whether these variations may have been influenced by the awareness-raising activities organised by schools.

This research aims to provide a detailed and contextualised analysis of changes over time, contributing to a deeper understanding of the national educational context and the social dynamics related to it.

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**Keywords:** ICCS, Rights and duties, Gender equality, Environment, Immigrants

## The measurement of soft skills in an innovation project on didactics

**Paola Daniela Virgilio - Ornella Campo - Vincenza Mione - Eugenio Sorrentino**

Introduction. Today's liquid and 4.0 society (Zanolli & Dall'Ava, 2017) is characterised by rapid mutability and it calls upon young people to consciously develop and use soft skills (hereinafter referred to as S.S.) that are a key element for students' educational success (Chernyshenko et al., 2018). Schools are asked to promote and evaluate S.S. in the curriculum, taking into account the results of this evaluation because of their fundamental importance for the didactic orientation of teaching (Biasi, 2017). It becomes crucial to tailor both the teaching approach and the curriculum in order to foster the continuous development of S.S., thus meeting the needs of the students and of the new labour market. Nowadays, educational policies (Guerra et al., 2014) are called upon to enhance aspirations, possibilities and motivations with new ways of acting, new habits, mental skills and new adaptive capacities that must be long-lasting and transferable.

Subject, objectives and research hypothesis. The aim of the research work is to study the impact of specific teaching approaches, along with measurement, valorisation and evaluation tools for the

development of S.S. in schools. The phases of the research: analysis of the results of the INVALSI tests for each order and grade; review of the most recent scientific literature on the evaluation of S.S. and reasoned comparison between the INVALSI results and the review; field study on 23 S.S. carried out thanks to practical workshops and structured interviews.

Data used. The data reported have been extrapolated from two different investigation typologies conducted in parallel: scientific literature review and field study research.

The literature review was carried out by browsing the Scopus, Web of Science (WoS) and Education Resources Information Centre (ERIC) databases, up to November '23 and with the following keywords: Skills - Social and emotional skills - Skills Instrument - Skills Measurement - Skills Primary education - Skills Secondary education. A total of 1063 articles have been extracted: 437 studies in Scopus, 305 studies in WoS and 321 studies in ERIC. A total of 524 studies have been removed: 223 did not include the development of an assessment tool; 88 were not peer-reviewed; 93 were related to university pathways; and 120 were focused on special education. Finally, 25 articles have been selected out of the 539 remaining ones, considering in particular: the impact of peer review on school performance; parental expectations on education and school performance; the relationship between students' well-being and school performance; and the influence of psychological well-being on school success/performance. The review document paved the way for the launch of the experiment.

The Field Study Research has been applied on a precise sample of male and female students (8 Classes of 3<sup>rd</sup> year from lower secondary school and 8 Classes of 4<sup>th</sup> and 5<sup>th</sup> year from high school) and carried out with a Pedagogy Workshop (SY 2022-23) called "C.T. e povertà educative: l'importanza dell'educare alla scelta" that put 23 S.S. into play.

The 23 selected S.S. were also tested in a second field study through other two project called "Lettera alle Istituzioni" (addressed to 3<sup>rd</sup> year classes from lower secondary school) and "Mostra della Legalità" (addressed to 4<sup>th</sup> and 5<sup>th</sup> year classes from high school). The two proposals have involved a total of 57,871 students belonging to public schools in the province of Trapani, stimulating the curiosity of teachers (Biasi et al., 2019) who got inspired for their teaching activities. The involved young people wrote, stamped and sent a 'letter to the institutions' telling episodes of legality to their 'Provveditore agli studi' (Director of Education): the letters are now exhibited in a symbolic 'emotional dashboard'. The older students prepared installations by using everyday materials, exhibited at the headquarters of the U.S.R. Sicilia Ufficio XI in Trapani, which has become a space for the expression of conceptual art. The whole experience has conveyed, imprinted and communicated the concept of Institution and State, and it has also driven young people to feel and live the concepts of: recycling, respect for the environment and life, sense of responsibility and belonging, respect for freedom, diversity, sustainability, and collaboration. The data collected along with the interviews confirmed the activation of the 23 S.S.

Method or approach. The study is part of the vast and heterogeneous landscape of qualitative educational research (Merriam & Tisdell, 2015), which differs in its constant striving for the possibility of practical/pragmatic/political intervention in learning contexts, if compared with strictly empirical research. In this sense, knowledge has value if it produces processes that improve society and its components. The aim of this research is to learn about the meanings of educational experiences as they are built and experienced by young people and guided by teachers at school. The research material was catalogued considering: the findings of the literature review and the data that emerged with the structured interviews conducted with a selected group of students and teachers, focusing on certain characteristics pertaining to personal experience and to a given school order. The interview method was properly chosen to give better access to the perspective of the involved student and teacher (Biasi, 2019), to grasp their conceptual categories, their interpretations of reality and the reasons for their choices/actions.



Interviews were performed using a single sequence of predefined questions which were previously tested on a group of 7 students and 7 teachers before being provided to the survey subjects. Testing the sequences was useful to verify their actual adherence and congruence with the research objectives and to check their clarity and to establish the running time (approximately 15 min.). It was also decided to include a series of redundant questions to stimulate in-depth study of the answers, given that already in the testing phase of the interview subjects tended to provide answers that were too synthetic or general. The questionnaire was drawn up following a specific pattern and it investigated the following topics: (a) motivation and expectations related to studies (topic also addressed with the teachers); (b) the young person's interests, the awareness and the role the student attributes to studying (topic also addressed with the teachers); (c) perception of the benefits obtained and level of satisfaction (topic also addressed with the teachers); (d) perception and interpretation of adolescence; (e) use of free time; (f) information on personal experience; (g) proposals for the educational offer (topic also addressed with the teachers). Results/argumentation. The results of the study made it possible to launch an experimental project for the promotion, detection and evaluation of S.S.

The information acquired thanks to the research, and decoded on the basis of the results of the INVALSI tests for each order and grade, confirmed the importance of the evaluation of S.S. and of new didactics for S.S. promotion. The study confirmed the value of S.S. also in distance teaching (DAD), taking into account different cultural contexts and the purpose of continuous learning. It was found that S.S. related to cognitive, social, emotional and practical skills should be considered fundamental for success in everyday life and in the modern world (Chernyshenko et al., 2018).

The results of the research enabled the definition of specific documents for each school order: the "Linee Guida per le competenze trasversali" aimed at supporting experimentation; a booklet of projects on soft skills; a manual of specific teaching activities; a set of forms for teachers' self-assessment (under construction); a set of forms for students' self-assessment; a set of forms for students' assessment; a list of upgrade paths for teachers.

The results also gave rise to a Network of 20 schools to support the experimentation that is being launched in the province of Trapani. The network, called "sperimentazione: didattica e valutazione delle C.T.", has as its leader body the Scuola Polo Invalsi - I.T.E.T. G. Caruso of Alcamo (TP). The institutes of the Network will share the following commitments: start the experimentation in some classes; training cascade of personnel; return of results to the territory; dissemination of results and good practices.

The data collected during the S.S. project, S.S. teaching and S.S. assessment will be duly analysed underway and compared with the results of the subsequent INVALSI tests in order to verify their actual evolution.

This study also opens up new research paths and it is hoped that any limits dictated by the boundaries of investigation among scientific fields will be overcome, in order to foster an increasingly unified, shared, multidisciplinary, multifactorial vision of physical well-being, health, quality of life, values and critical thinking.

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**Key words:** Soft Skills, Promotion of Soft Skills, Assessment of Soft Skills, Teaching of Soft Skills

## **Assessment and certification for transversal skills and orientation (PCTO)**

**Maria Chirico - Alessandra De Angelis**

Introduction. "learning by doing, to learn to do things you don't know how to do..." this could be the synthesis of the paths for transversal competences and guidance, which appeared in the school system, by legislative decree 77/2005 implementing the law of 28 march 2003, n. 53, delegating the government to settle the general rules on education, the essential levels of performance as for education and vocational training (moratti reform), until the recent innovations provided by the 2019 budget law.. the conception, at the basis of this teaching methodology, is to bring the world of school closer and closer the world of work, so that they will be two entities/ sizes removed, but intersecting and communicating with each other. students of the secondary education institutions are provided with the opportunity to observe the world of work, to acquire theoretical/ practical skills, but above all to encourage the process of orientation, through the choice of a course of tertiary studies or a vocational path to support their inclusion in the world of work. the pcto guidelines, pursuant to article 1, paragraph 785, law 30 december 2018, n. 145, represent a valuable framework of reference for the construction and strengthening of basic transversal skills, through the preparation of a unified and vertical training curriculum, with an orientation connotation within the ptof, the provision of minimum standards and the mentoring and accompanying services offering.

transversal competences are currently the subject of a wide international discussion as well as extensive discussion by various authors and research bodies, with different proposals for classifications, based on sometimes deeply assumptions. the recommendation of the european council of 22 may 2018 summarized in a single document the vast literature produced in the field of "key competences for lifelong learning", drawing up a framework that outlines in particular 8 key competences, all of equal importance for the personal development of the citizen.

given the particular characteristics of transversal competences, special tools are needed to measure the gauge the level of possession of the same competences, along with the educational path and curricular learning.

PCTO activity requires the following activities:

- planning;
- management;
- monitoring;
- evaluation;
- certification.

the design/management and development of transversal competences/guidance actions must, in any case, be followed by a structured and articulates monitoring system, evaluation and certification of these competences, in order to set quality standards and contribute to the dissemination of good practice.

the process of monitoring the path requires, from the school in general, the use of a kit of tools prepared by the class council, to detect the goals achieved and know the degree of the student's personal awareness, in addition to his/her satisfaction, to make the learning process effective.

as for the evaluation of the pcto experience, the procedure usually used is to consider, within the class council scrutiny, the impact of the outcome of the evaluation grid, drawn up by the company tutor.

in different school contexts, and especially from the pandemic period onwards, the path of transversal skills and orientation was carried out in a protected context at school rather than inside the company. therefore, the evaluation of the pcto was a simple recognition of the fulfilment of the legal obligation, without feeling the need to dwell on a more careful and accurate evaluation of the experience itself.

goals and research assumptions. the object and the goal of the research is to identify a possible path of evaluation of the pcto, starting from the analysis of the rav of the institute, up to identify the links within the ptof, in the improvement plan, the social reporting, the student curriculum, the student portfolio, the admission to the state examination, as well as the discussion of the oral exam itself.

an important starting point for the research was the analysis of the results of the certification pcto skills project in the tourism sector - unioncamere renaia/fipe/federalberghi, which has the "istituto alberghiero pertini brindisi" experimentally joined.

this analysis leads to the following questions:

- which other innovative/integrative procedures can be considered in order to evaluate and certify pcto pathways?
- at the same time, is there a correlation between invalsi certification and pcto certification?
- is it possible to hypothesize an invalsi model for measuring pathways for transversal skills and guidance?

data used. in order to process the research, it proved to be necessary to analyse the following data within the institute:

- n. of students enrolled during the three-year period;
- n. of students affected by pcto activity during the three-year period;
- the average number of hours of pcto spent for each of three-year period;
- invalsi grade 13 test results;
- fourth and fifth grade ballot results;
- class four and five mark for conduct ;
- hours, annualities and n. of students participating in the experimental project pcto certification in the tourism sector.

in addition, the analysis also covered:

- data from institute documents: ptof, rav, improvement plan, rs, student curriculum, student's portfolio.

- kit of the experimental project pcto certification in the tourism sector (observation cards, soft skills card, test sitting knowledge, sitting and soft skills test).

method or approach. the theme of the evaluation of the pcto requires a different methodological reflection, compared to the assessment of learnings in each subject, as it involves the assessment gained in work contexts, able to bring out "new skills" and potential, aimed at achieving the educational success of the student. the normative evolution of the pcto, from d. lgs. 77/2005 to the present day, has given an increasingly significant role to this methodology, to the point of being a requirement for admission to the baccalaureate exam and being part of the oral exam itself. the evaluation of the alternation path, therefore, becomes an integral part of the student's final assessment and requires the involvement of the collegiate bodies/ governance of the school, beside a review/ integration of documents/ regulations, from the ptof to the educational pact of co-responsibility and the students charter of rights and duties. results or arguments. the pcto evaluation model can be set up as a regulations product result on the one hand and the other the result of an action-research practice, pre-packaged/ prefigured in the school microenvironment by the various parts involved in the process: business tutor, school tutor, student and class council.

at macro level, an operational protocol for the certification of skills, involving companies, certification bodies and school proves to be necessary.

the experimentation started at the hotel institute of brindisi in agreement with unioncamere, renaia, fipe and federalberghi on the certification of transversal skills and orientation in the tourism sector, can be validated as best practice to be extended to all productive sectors in the school world and widely.

the results of the action research as for the evaluation of the pcto can be expressed on the following hinges:

- self-assessment of the experience by the student, in order to activate the degree of the student's awareness students and stimulate their critical thinking;
- evaluation of the transversal/soft skills learning process by the company tutor having a guiding role in the cultural/professional path and life/work project;
- summative assessment of the pcto experience by the class council as an expression of the student's self-assessment evaluation synthesis, the evaluation of the learning process by the company, the mark for conduct the learning assessment in the each subject.

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**Keywords:** Assessment, Certification, Learning, Skills, PCTO, INVALSI

## Local authorities, schools and the third sector: an exploratory study

Ilaria Ravasi - Franco Brambilla

The analysis of the scientific and grey literature over the last 10 years has led to a non-homogeneous and simple definition of ESL. The majority of the literature agrees in describing the phenomenon as complex and multifactorial (MIUR, 2014, 2018, Barone, 2017), without going into the merits of each of the facets underlying the term. The complexity of the phenomenon is defined by the different meanings placed in the container of early school leavers: explicit, implicit, early school leavers, school drop-outs. With regard to the latter, the

literature identifies its multifactorial nature by attributing it to three macro-categories of factors (INVALSI, 2019): ascriptive, such as socio-economic capital of origin and family background; contextual, such as related to the location and characteristics of the school; individual, such as motivational and psychological. However, Article 34 of the Constitution of the Italian Republic establishes the obligation to make the school system equitable and inclusive. The concept of equity is also complex and multidimensional, as in the case of early school leaving. Eurydice (2021) defines equity as the guarantee of a minimum basic standard of education for all and emphasises that personal and social circumstances, such as gender, socio-economic status or ethnic origin, should not be an obstacle to the realisation of educational potential; this view calls into question two dimensions: equity and inclusion. In particular, to analyse equity in the school system, INVALSI (2021) uses an indicator to measure the extent to which test results depend on three factors: differences between schools, differences between classes, differences between pupils in the same class. In the light of these brief aspects, it is necessary to recall the importance of a relevant regulatory instrument for the promotion and development of equity in the school system: Presidential Decree 275/199 (Bassanini Law<sup>8</sup>), subsequently reinforced by Law 107/2015<sup>9</sup>. School autonomy establishes a decentralised model of education by placing the emphasis on the territory in which the school is located, allowing it to be used according to needs and requirements. In this perspective, the local authority, in agreement with the comprehensive school, becomes a participant in the pedagogical and educational policy choices to be implemented in terms of governance and financial management in accordance with territorial needs. The regulatory instrument of school autonomy therefore suggests a networking of services active in the territory to meet the needs of a specific context (Ferrero, 2023). On the basis of this theoretical framework, an exploratory study has been developed of the projects activated for the prevention of early school leaving, identifying some of them characterised by territorial agreements between local authorities, comprehensive institutions and third sector bodies. The research, exploratory in nature, was based on a desk study using keywords with the main search engines, supplemented by an examination of the reports of the main foundations active in the fight against ESL in the Italian context. The analysis of the projects made it possible to divide them into three macro-categories according to the basic orientation of the projects carried out: prevention, i.e. aimed at preventing the emergence of situations of early school leaving; contrast, i.e. centred on actions aimed at limiting the impact of risk factors on subjects already exposed to such factors and thus "at high risk"; recovery, i.e. activities aimed at reintegrating drop-outs into the education and training system. The study went on to analyse in detail the projects in the first macro-category, i.e. those activated to prevent the phenomenon of dispersal, in the light of what emerges from the scientific literature: measures taken at an early age lead to less dispersal and fewer resources being used to recover dispersed human capital (Heckman, 2001). When analysing the interventions in the preventive category, the educational alliances between comprehensive schools, local authorities and third sector organisations stand out. Within these alliances, two types of network stand out: one with the comprehensive school as the lead partner, the other with the local authority as the lead partner; a second macro-distinction seems to be related to this macro-distinction concerning the duration of the actions. This macro-distinction seems to be linked to a second macro-distinction concerning the duration of the actions. The duration of the project seems to be short term (school year) when the lead partner is the comprehensive school, whereas a more systematic approach is noted when the lead partner is the local authority, as there is a broad view of the territory and the possibility of concluding more permanent agreements. The continuation of the study intends to further investigate the

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<sup>8</sup><https://www.parlamento.it/parlam/leggi/97059l.htm>

<sup>9</sup> <https://www.gazzettaufficiale.it/eli/id/2015/07/15/15G00122/sg>



category of projects with the local authority as the hub. Given that Italy is a very diverse territory in terms of various aspects (economic, social, etc.), it is considered appropriate to carry out a study first on a territory identified on the basis of two main criteria: the rate of implicit school drop-out (INVALSI) and the existence of territorial projects for the prevention of school drop-out led by the local authority (Municipal Register). The study will continue with the analysis of the ISTAT data of the selected territory, the decisions of the municipal councils on the approval of the Right to Education Plan, the resolutions and decisions of the councils, the active agreements with comprehensive schools and third sector bodies and the statutes of the latter. Particular attention will be paid to reconstructing and mapping the processes developed in the area under consideration, also through the acquisition of additional information (interviews, focus groups, etc.), in order to identify the strengths and weaknesses of the network processes. The final objective is to outline effective guidelines for the territory to prevent the phenomenon of dispersal, which can be extended to territories with similar characteristics.

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**Keywords:** Equity, School Autonomy, Early school leavers, Territory

# **SESSION 14- INVALSI TESTING AND SCHOOL SELF-EVALUATION FOR AN EQUAL AND INCLUSIVE SCHOOL**

**ORGANIZER: INVALSI**

**COORDINATOR: GIUSEPPINA LE ROSE**

**DISCUSSANT: LORENZO MARAVIGLIA**

**19 OCTOBER: 4.30 PM -6.30 PM {ROOM 4 – TEACHING 14}**

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## **Gender Equality in the education system: an investigation and comparison of national case studies based on standardized test outcomes**

**Marta Castagna - Maria Carbone - Francesca Cimmino - Alessia Cividin**

We are a community of practices created thanks to our participation in previous editions of the Invalsi Seminars; we come from different regional contexts and different levels of school education.

The symposium proposes a regional and national comparative analysis on gender equality and equity in the Italian school system, examining the perspectives, experiences and perceptions of school communities on education in this context, with experiences deriving from schools in different regions from the North to the Center to the South of Italy and of different levels (from primary school to lower and upper secondary school). Through the use of case studies and theoretical contexts of reference, we explore the dynamics that lead to gender inequalities in education, issues relating to access, school orientation, participation, performance, choice of educational paths and choices, as well as educational channels and implicit and explicit dispersion.

The results collected so far by the community of practices show that the different schools involved have reacted, with respect to the objective of achieving gender equality, in different ways and with different methods and awareness, also given the greater level of accentuation of gender differences in secondary schools and an increase in the characteristics of equality in primary and lower secondary schools. This first comparative evidence led to planning challenges and objectives in the daily management of inclusive teaching and conscious training orientation. At the same time, the community of practice has developed an innovative protocol to address these challenges and overcome the gender difference in the scholastic approach and in educational, guidance and training choices.

Gender equality was analyzed through the available and variable data regarding access, participation, performance, educational choices and gender violence, as well as university choices relating to post-diploma and university results in terms of acquisition of CFU (University Educational Credits) and consistency with secondary school courses.

The Invalsi data provided evidence on the performance of male and female students, in particular in the STEM disciplines Science (science), Technology (technology), Engineering (engineering) and Mathematics (mathematics), identifying any possible gender disparities, also including data relating to early and late students, native students and first and second generation foreign students. The working group tried to identify the possible areas of immediate operational intervention, but also the possible medium and long-term interventions in terms of conscious orientation in the STEM area and in female students' discrepancy between choosing a secondary school in the ATEM area and university choice in the non-STEM area.

The objective of the research/action was to evaluate how the educational institutions involved use Invalsi data to address gender equality and inequality, identifying existing challenges, monitoring the progress made and evaluating the effectiveness of policies and of the programs implemented, the resources and opportunities put in place by the various educational institutions to reduce the gaps in this area too, be they territorial or gender-based. An attempt was also made to involve schools with second level courses (evening courses) and the CPIA (Provincial Centers for Adult Education), where gender education - even basic, starting with literacy - can further impact the possibility of access to the world of secondary education and the world of work, in terms of opportunities and personal fulfillment.

The main strategies used and analyzed (laboratory and learning by doing, problem solving and inductive method, activation of synthetic and creative intelligence, organization of working groups for cooperative learning, promotion of critical thinking in the digital society, adoption of teaching methodologies innovations, review of classroom settings, creation of workshops) aim at acquiring a positive attitude towards Invalsi tests and conscious orientation, greater competence in STEM disciplines and a change in learning processes and in the acquisition of skills and soft skills. They must not remain a mere project, but must be implemented and constantly evaluated, for the purposes of continuous improvement, also starting from nursery school and the 0-6 year segment.

All this leads to an increase in perceived well-being within school communities and the desire to adopt a gender equity configuration for future teaching activities.

Almost all the survey participants recognized the importance of gender equity in the curricula relating to the training of male and female students, but also the importance of the training of the teachers themselves, in order to consciously implement the planning and implementation of an effective system of permanent orientation, understood as a process aimed at facilitating knowledge of oneself, of the educational, occupational, social, cultural and economic context of reference, with strategies implemented to relate and interact and in order to encourage maturation and development of the skills necessary to be able to independently define personal and professional objectives relevant to the context, with a view to developing a concrete life project, with consequent positive repercussions also on the job market and on the economic development of the country. Teacher training from an LLLP (LifeLong Learning Program) perspective can be a further lever for overcoming gender differences in every segment of school curricula.

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**Keywords:** Gender equity, Comparative analysis, STEM

## Perceived difficulty of INVALSI tasks. How much do gender differences matter?

**Bianca Nicchiotti - Camilla Spagnolo**

Introduction. The topic of difficulty in mathematics has been object of research for years; in particular, the difficulty of a mathematical task seems to be influenced by various factors, including text comprehension (Spagnolo et al., 2021) and affective factors (Zan et al., 2006). Only in recent years, research in mathematics education has also started to consider the perceived difficulty (PD) of a task (Saccoletto & Spagnolo, 2022; Spagnolo & Saccoletto, 2023a). PD is different from the difficulty of a task, as the latter is usually assessed in retrospect, considering the ratio between the number of students who solved it correctly and the total number of students to whom it was administered (Mehrens & Lehmann, 1991). However, there is currently no definition of PD in the context of research in mathematics education. Within the framework of exploratory studies on the topic, factors influencing the perceived

difficulty of a task by students have been grouped into five macro-categories: *Resolution Strategies, Skills and Experience, Emotions, Task Formulation, Personal Considerations* (Spagnolo & Saccoletto, 2023b).

Within this framework, gender issues, the effects of which on the PD of students have not been investigated yet, fit in transversally. The phenomenon of the gender gap in mathematics is well-known, as national and international surveys show that, in many countries, boys perform better than girls in mathematics at all school levels (Giberti, 2019). In particular, Italy is one of the countries with the largest gender gap in favour of boys (OECD, 2019). Some studies confirmed that the gender gap in mathematics cannot be attributed to biological or cognitive differences between boys and girls: on the contrary, other factors may influence it, including metacognitive influences, affective factors and general biases (Giberti et al., 2016).

**Research object and hypothesis.** When solving mathematical tasks, boys and girls seem to have different approaches: usually more boys than girls solve the same question correctly; moreover, when answering incorrectly, the former prefer different distractors than the latter (Giberti et al., 2016). The research developed aims to analyse students' PD from a gender perspective, using INVALSI tasks and taking the relevant data as a reference. In particular, the aim is to highlight the possible existence of differences between boys' and girls' perceptions, also in relation to the categories of factors that influence them. In this sense, INVALSI tasks are an optimal tool as they have already been used to analyse students' PD (Spagnolo & Saccoletto, 2023a; 2023b); moreover, the related data on the results of the nationwide administration allow a precise analysis of the gender gap that emerged in each of them.

**Data used.** We built a questionnaire consisting of two INVALSI tasks, administered in previous years to Grade 8 and Grade 10 students, each followed by a series of questions related to the PD. The selected INVALSI tasks are both related to the dimension Argumentation, but relate to different domains (Relations and functions and Numbers respectively) and they are of different types; in fact, Task 1 is a multiple-choice question while Task 2 is an open-ended question. The questions were selected on the basis of the preliminary analysis carried out on INVALSI data, from which we concluded that their difficulty is different (respectively 40.3% of correct answers for Task 1 against 17.8% for Task 2) as well as the gender gap by which they are characterised, as Task 1 is balanced while Task 2 presents a moderate gender gap in favour of boys.

The questionnaire was administered to 7 classes of two secondary schools (5 first classes and 2 second classes) with a total of 148 students, of which 61 boys and 87 girls. The two schools were a Technical Scientific Institute and a Human Sciences High School; the classes in the former had a predominance of boys, while those in the latter had a predominance of girls. The questionnaire was administered via Google Forms and the students responded during class time using the school's computers.

**Method.** The questionnaire was the one proposed in (Saccoletto & Spagnolo, 2022), since we used the categories determined in that study as a starting point. A preliminary quantitative analysis was carried out to select the INVALSI tasks to be proposed. During this phase, for the selected questions, the presence of gender gap on a national scale was assessed by calculating the value of the gender gap index  $GGI_k$  (Spagnolo & Nicchiotti, 2023).

The students' answers were then collected and analysed qualitatively by performing a textual analysis with reference to the previously discussed PD categories. In addition, the mean values of the students' difficulty ratings and the  $GGI_k$  referring to the results of the students in the sample were calculated. This was done by considering the gender perspective and highlighting possible similarities and differences.

**Results.** Firstly, the quantitative analysis of the INVALSI data allowed us to select the two tasks to be administered to the students. The quantitative analysis of the results obtained and the calculation of the  $GGI_k$  on the data of our sample allowed us to highlight some differences with the national results: in this case, in fact, we observed for both tasks the presence of a severe gender gap in favour of males.

The analysis of the students' ratings and answers allowed us to highlight some differences between the PD from boys and girls. Boys tend to rate the tasks as easier than girls, regardless of whether they can solve them correctly or not. Analysing the open-ended answers, we observed that the categories important for determining the PD seem to be almost the same for boys and girls. The two main differences we found are related to the connotation the two groups give to the same elements and the

absence of references to personal considerations by the boys. With regard to the first aspect, we note that, in general, the same element is ambivalent for boys, being considered positive by some and negative by others, but usually negative for girls. However, the biggest difference with regard to the categories of factors influencing the PD is the total absence, for boys only, of any reference to personal considerations. This is one of the categories involving subjectivity, which instead seems to be discarded by boys when explaining their PD, whereas girls always refer to it.

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**Keywords:** Perceived difficulty, Gender gap, Mathematics education, Students

## **Neurodiversity and learning styles. A pathway for the promotion of self-awareness of one's own peculiarities and respect for those of others in favour of a more inclusive and tolerant climate towards differences as an action against implicit dispersion**

**Paola Doghieri - Cristina Giacomini - Lorella Camporesi**

Introduction. In the A. Bertola secondary school in Rimini, the analysis of the INVALSI test results is an essential tool for planning the educational offer. One indicator that appeared critical at the time of drafting the 2022-2025 Three-Year Educational Offer Plan was that of implicit dispersion, i.e. the percentage of students who, despite attending, do not reach the learning targets set at the end of the first cycle of education, (levels 1 and 2 in the Invalsi tests in mathematics and Italian). The analysis of the three-year period 2019 - 2021 and 2022 showed a significant increase in the period of the pandemic

from 14% to 24% (2019 vs. 2021), which, however, was followed by an overall stability (23% in 2022). Early school leaving is increasingly seen as an indicator of the quality of school systems, in terms of equity, inclusion, educational opportunities and success (Pandolfi, 2017). The interpretation of the phenomenon highlights the incidence of several factors, among them some inherent to the individual characteristics of students (learning difficulties and disabilities, special educational needs, rejection towards school, disengagement and lack of motivation, self-perception of inadequacy, etc.); and others linked to school organisation and climate, such as the way teaching is carried out, the quality of interpersonal relations, etc. (Eurydice & Cedefop, 2014) An intervention on this critical issue therefore had to be multidimensional and touch on the different aspects involved. Among the various strategies identified, an intervention was designed for the nine first classes of the institute on the subject of neurodiversity.

The construct of neurodiversity was introduced by Australian sociologist Judy Singer in 1998 who coined the term 'neurodiversity' in her dissertation.

The term 'neurodiversity' refers to a subset of biodiversity that concerns the neuro-cognitive variability of the human population and the uniqueness of each mind. It is a model of thinking aimed at promoting the rights of people who are neurologically divergent from the neurotypical norm. In educational and social practice, the concept of neurodiversity is a useful paradigm for overcoming the concept of normality and diversity as opposites, making it possible to look at the neurological, cognitive and sensory variability that characterises the human population as natural developmental differences, thus stimulating a vision in which these differences are not necessarily perceived as deficits but as individual peculiarities, neither right nor wrong.

The neurodiversity paradigm also sheds new light on the concept of inclusion by reinforcing its meaning. If by inclusion we mean a readiness to welcome in advance, and if welcome springs from the recognition of the common right to diversity, then the neurodiversity paradigm supports and justifies the inclusive model by conveying a perception of diversity that is not necessarily identified with disability, but that encompasses the various neurological, sensory, communicative and social characteristics of personal situations, placing them at the centre of educational action.

Neurodiversity can be declined according to many parameters, one of the most important variables for learning/teaching contexts being learning styles. Learning style means "a person's preferred approach to learning, his or her typical and stable way of perceiving, processing, storing and retrieving information" (Mariani, 2000)

Objectives. The project, entitled "What style are you? A pathway of self-awareness and knowledge of oneself and others through the neurodiversity paradigm", aims to convey the neurodiversity paradigm starting from the detection of one's own learning style, thus enabling pupils to experience at first hand the existence of neurodiversity and to verify that it is 'normal' by fostering self-knowledge through self-awareness of one's own peculiarities and respect for those of others in order to increase self-esteem and perceive the school as a positive environment in favour of a more inclusive and tolerant climate towards differences.

Styles do not pigeonhole pupils as abstract 'types' but describe their complexity and uniqueness. Comparing and analysing the various learning styles promotes adaptation, flexibility, negotiation, fostering reflection and metacognition with respect to each pupil's learning processes and modes. The student who becomes aware of his or her own style learns to learn, and can organise his or her own learning by identifying, choosing and using various strategies and various modes of information and expression according to his or her own characteristics.

Neurodiversity, learning styles, inclusion the key words of this project all seem to be centred on the personal and private dimension of the individual student. But learning takes place in the classroom, i.e. in a social dimension in which the particularity of the individual meets, or clashes, with the particularities of other individuals.

The individuals in the classroom, however, are not only the students but also the teachers. The project therefore has a twofold objective: on the one hand, to promote the concept of neurodiversity among pupils and teachers and, on the other hand, to survey the composition of the learning styles of the pupils

in the classes concerned in the belief that this may foster in teachers the propensity to differentiate interventions and teaching methods to the benefit of a didactics capable of reaching everyone without excluding anyone.

The detection of learning styles, already a consolidated practice, is thus declined within a broader framework aimed at conveying awareness of neurodiversity as a biological requirement of the human population, involving pupils in experimenting with the assumptions that this concept implies, also by introducing the categories of neurodivergence (DSA and Autism in particular) that fit within the neurodiversity paradigm itself.

**Method.** The project involves three interventions in each first class of one hour each, for a total of 27 hours. The interventions were shared with the teachers of the classes involved, contacted in advance by the DSA and BES reference teacher, and were conducted by a specialised support teacher. To date, 5 out of 9 classes for a total of 109 pupils have been involved. The interventions are expected to be completed by May 2024.

The detection of learning styles was done by administering a reworked questionnaire based on Mariani's 40-question model, which refers to the VARK model, developed by Fleming in 1992 and which explores learning style through the sensory-perceptual channel.

VARK stands for the words Visual, Aural, Reader/writer and Kinesthetic. These terms refer to four learning styles: a Visual learner prefers to observe images and diagrams in order to learn best, (Mariani in the questionnaire identifies this as a non-verbal visual style), an Aural learner, is predominantly benefited by listening, while a Reader/writer recognises text (read or written) as the best vehicle for approaching knowledge (in the questionnaire referred to as a verbal visual style); finally, a Kinesthetic learner finds it natural to learn through direct experience and practice.

Each statement of the questionnaire can be answered by expressing a degree of agreement according to a likert scale with 4 levels to which a value from 0 to 3 is associated, in the calculation of the various scores referring to each type of style, the prevalence of a learning style may emerge when it prevails over the others by at least 3 units, or no clear preference may emerge, when no style differs by more than 2 units from the others. In this case one has a multimodal learner. Multimodals can be: bimodal if there are two styles prevailing over the others, trimodal if there are three styles prevailing, or quadrimodal (VARK), if there are no prevailing styles and the differences between all styles are contained within a maximum of two units.

**Results.** The overall analysis of the results obtained in the questionnaires administered so far shows that 83 pupils (76%) are multimodal, of these 37 are bimodal, 36 trimodal and 10 VARK and only 26 (24%) have a prevailing style, of these 21 are Aural learners, 3 Visual learners and 2 Kinesthetic learners, no pupil shows a prevailing Reader/writer style based on read-write.

Furthermore, of all the sensory-perceptual channels present in the styles of the population surveyed, it can be noted that the R channel related to reading-writing is the least represented, affecting 27 out of 109 pupils (25%), while the most represented is the Aural-auditory channel, which affects 81 pupils (74%), the V channel affects 68 pupils (62%) and the K channel based on the coenesthetic modality 64 pupils (59%).

If the data are confirmed, it can be deduced that pupils who prefer text for learning are a very small proportion of students, and that the read-write channel is present in a low percentage and only in combination with other sensory-perceptual channels. This must make the teaching staff reflect on the importance of adopting teaching methods that do not focus on reading and text, and on the need to identify multimedia teaching methods that take into account the variability or neurodiversity that characterises each class group.

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**Keywords:** Neurodiversity, Learning styles, Implicit dispersion, Inclusion

## **The Return of Pygmalion: Evaluation of Students with Migration Background Between School Selection and Inclusion**

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Introduction. Student evaluation, especially ongoing assessment, could be considered an integral part of the educational process (Corsini, 2023): by highlighting the strengths and weaknesses of each learner, areas of fragility and areas undergoing enhancement, each student is assisted in achieving educational goals, agreed upon with the teacher taking into account needs, competencies, and potentialities. According to the perspective of educational evaluation, numerical grading and competition within the class group are not considered motivating factors but rather dysfunctional ones: extrinsic motivation (based on the desire to obtain positive grades, perhaps the highest in the class) can interfere not only with the intrinsic motivation of the learner (the pleasure of learning new, interesting, and useful things) but also with the internal dynamics of peer groups, undermining teamwork and education in mutual assistance. This approach is considered fundamental for inclusive teaching (Dal Zovo and Demo, 2022), specifically teaching aimed at individuals in conditions of vulnerability (migrant students, students with disabilities, and/or those from disadvantaged socioeconomic and cultural backgrounds). These students may face serious difficulties with teaching methods and educational systems that do not take into account their specific educational needs.

In this perspective, adopting inclusive teaching does not mean giving up evaluation or taking the shortcut of less ambitious learning objectives in an "easy" or mediocre school; on the contrary, teaching inclusively involves the daily and creative effort of building learning together, each with their own peculiarities, without the need for a diagnostic label that distinguishes (or selects, depending on the viewpoint) the "normal" from the "different" (Zappella, 2021). This approach recognizes the usefulness of INVALSI tests for macro-level evaluation. The data collected through these tests provide a very rich informational overview of the overall health of our educational system, data that should be integrated with other qualitative data, such as those from self-assessment reports (RAV) and the collection of school inclusion practices. The problem may arise when these data are used at the micro-level to assess the learning of individual students, as this is not their original function.

Objectives and Hypotheses of the Research. This debate intersects with the ministerial choice to allow students to include the results of INVALSI tests in their educational curriculum. While this choice may provide an additional opportunity for students with higher performance on standardized tests, it also risks becoming a double-edged sword that could further penalize students in difficulty and the schools



trying to include them. We refer in particular to students with migration backgrounds, especially first-generation ones, who often come from disadvantaged backgrounds (as students with certified disabilities are generally excluded from INVALSI tests). These students typically achieve lower results than their Italian citizen peers, partly because the tests are administered in the language of the host country. Thus, in their case, the tests not only measure their ability to understand a written text (Italian) or solve problems in arithmetic, geometry, statistics, etc. (mathematics) but also their linguistic competence in Italian as a second language. It is true that their results are generally worse in Italian and Mathematics tests, but not in English reading and listening tests (Filosa, 2022). Not to mention the additional emotional and anxiety burden resulting from the objective disadvantage of having to face tests in a language different from their own.

The aim of this study is to highlight an intrinsic criticality of INVALSI tests administered to newly arrived students or those in the process of literacy: taking a test in a language in which one's proficiency is insufficient invalidates the result of the test itself, confusing the measurement of the skills targeted by the test (e.g. scientific-mathematical) with the linguistic skills necessary for decoding the instructions. Another critical element arises from the improper use of standardized test results, almost as if to measure the quality of teaching, teachers, and students: this is creating a qualitative demarcation between schools and contributing to the channelling of enrolments. Furthermore, with the proposal to include the results in a student's personal file, there is a risk of fuelling the predictive exercise of failure through the mechanism of self-fulfilling prophecy, a phenomenon widely documented in scientific literature (Pygmalion effect, Rosenthal and Jacobson, 1992). The objective is to identify and propose modes of administration (and subsequent use) of INVALSI tests that are more respectful of the individual's history, framing them within an individualized educational path that takes into account all the educational and learning objectives of our school system, not included in INVALSI tests: not only other curriculum subjects (e.g., geography) but also citizenship education, essential for developing "emancipatory intercultural competencies" (Buraschi and Aguilar, 2023) that are truly transformative, with awareness of the power asymmetries that characterize relationships even within schools (and evaluation systems). The hypothesis is that such an evaluation would not only provide a completer and more inclusive picture of our school system but could also have an educational (and non-selective) function for migrant-origin students themselves.

**Data Used and Methodology.** In this perspective, testimonies about the experiences of students with migration backgrounds and teachers facing INVALSI tests will be collected. Various voices will be collected, from primary to secondary schools of all levels, in a context such as that of Veneto and Verona, characterized by a strong and relatively ancient presence of students with migration backgrounds, and by a very active third sector in ensuring their school and educational inclusion (Bin and Gamberoni, 2023). In this territorial context, school results in INVALSI tests are generally commendable and above the national average (INVALSI 2023), demonstrating that education aimed at inclusion is not destined for educational failure. Testimonies will be collected through interviews with key witnesses, recorded and subsequently transcribed verbatim, through written self-reports from teachers and students, and through writing workshops. The material is collected from March to May 2024 but refers not only to the administration of the current INVALSI tests (2024) but also to those of previous school years.

**Results and Arguments.** Collecting testimonies on how INVALSI tests are experienced, faced, and justified is important, both for students and teachers. Each teacher holds stories in their heart that have emotionally touched them, because they have seen in the eyes of these migrant children the anxiety of inadequacy in the face of tests that risk labelling them forever, marginalizing them in the limbo of "incompetent" students, useless both from an educational and employment perspective. Finding the right strategies, "sterilizing" the tests from any anxiety implications for the individual, returning them to the function for which they were constructed (system evaluation, not individual), placing them in a broader, multidisciplinary, multidimensional, and intercultural educational and evaluative context (National Observatory for the Integration of Foreign Students and Intercultural Education, 2022) can be useful both for improving the learning of individual students and for giving sense and meaning to the work of teachers.

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**Keywords:** Inclusive teaching, Students with a migratory background, INVALSI tests

## State Examinations Grade 13: Voices from the Boards of Examiners

Paolo Davoli - Francesco Orlando

**Introduction.** At the conclusion of the state examinations that mark the end of secondary education courses, the presidents of the examination committees are required to compile a "President's Report." Originally, the report was compiled by the presidents on a voluntary basis and in a free and verbose form. Since 2021, it has been required through an online form integrated into the examination management package, *Commissione Web*, featuring a series of closed-ended questions and a few open-ended questions.

**Data Used.** Every year, approximately 500,000 students undergo state examinations, involving around 14,000 committees, each composed of two "class-committees", totaling around 28,000 classes reaching "maturity". The presidents of these committees are typically school principals or teachers with at least ten years of experience, either currently in service or retired for no more than three years, or even, albeit to a residual extent, university professors. Annually, the Ministry disseminates summary and analytical data by region regarding student outcomes as derived from the National Student Registry (e.g., MIM 2023a) and their choices for the first test topics (e.g., MIM 2023b). Conversely, the Presidents' Reports are typically examined for internal evaluations by the Ministry Technical Structure of State Examinations and the Inspectors coordinators of each individual Regional School Office, with governance objectives for the system, without being subject to public communication. This paper aims to examine the outcomes of the Presidents' Reports for the years 2022 (27,037 respondents) and 2023 (27,583 respondents).

**Subject, Objectives, and Research Hypotheses.** The research objective is to provide an analysis of the Presidents' Reports on state examinations since they represent a qualified, albeit qualitative, perspective that allows to examine the actual progression of examinations through privileged witnesses and to make system evaluations on various themes. In particular, the forms filled out by the presidents reflect their views on the "May 15th documents" with which the classes are presented for examination, on the conduct of school programming, and on the organizational aspects of the examination.

These reports contain the examination presidents' perspectives on school didactics (programming, extracurricular activities, CLIL, PCTO, Civic Education, etc.) and on the operations of the committees

(collegiality, choice of interview materials, operational procedures with candidates with Special Educational Needs, the mode of the new examination for Vocational Institutes, etc.). They can be very useful for an informed discussion on the concluding moment of our students' course of study and for improving the operational practices of schools and committees.

**Method or Approach.** The data from the Presidents' Reports for the year 2023 (and for the purpose of comparison, from the year 2022) will be examined using ordinary descriptive statistical techniques, reproducing with graphs or tables the data of greatest interest for evaluating the discussed issues. The open-ended responses of the presidents will be examined using software-assisted categorization techniques and potentially AI.

**Results and Argumentation.** Preliminary investigations conducted in 2022 on the Presidents' Reports of a single region (Davoli 2023, Brescianini and Davoli 2023) have highlighted various significant aspects of the operations of schools and examination committees, which are briefly summarized here. The final paper will extend these evaluations to the national level. Areas of positivity and criticality emerge, on which to focus improvement efforts.

#### 1. School Didactics Viewed through the "lens" of Boards of examiners

a) School disciplinary programming is deemed non-compliant with National Indications and Guidelines in 10% of classes, a figure not to be overlooked, but perhaps also influenced by the pandemic emergency.

b) The transversal teaching of Civic Education, introduced by Law 92/2019, requires a revision of institute curricular planning practices and individual class council practices. The responses collected from examination presidents testify that schools have significantly taken on this new subject, with a process that, while not yet concluded, is nonetheless positively activated and overseen in terms of the number of disciplines involved and the definition of learning objectives.

c) CLIL competencies were explored during examinations in only one-third of classes, with no significant differences between lyceum and technical paths (and also in vocational paths, although not mandatory). This percentage indicates a path that is still significantly incomplete.

d) The Student Curriculum is a novelty that had significantly gained ground but in 2022 was not yet fully adopted by schools, students, and committees. Over 80% of sub-committees reported that the Curriculum was useful for preparing students for the oral test, with less acceptance of the innovation from lyceum paths compared to technical and vocational paths.

#### 2. Work of the Examination Committees.

a) The level of internal agreement is judged positively in almost all committees (in 2022, the examiners were all internal, due to post-pandemic emergency procedures).

b) The choice of the starting "material" for the interview ("texts, documents, experiences, projects, problems") is a collegial operation, although individual subject examiners play a significant role, and this was the case in almost all committees. In 80% of cases, a textual or iconographic document was proposed (in a higher percentage in high schools, while experiences, projects, problems were proposed in much lower percentages, between 10 and 15% of sub-committees, more frequently in technical and vocational paths).

c) Over a quarter of sub-committees stated that they had requested consultancy support from the Territorial Scope Offices or from the technical managers responsible for the examinations. This is a high percentage, which indicates the need for further training on state examinations for teachers and presidents.

d) Inclusion practices appear to be well integrated into the daily teaching of our schools, with positive repercussions during examinations. Just under 50% of sub-committees reported having candidates with disabilities, and in 36% of these cases, they reported having prepared non-equivalent differentiated tests for some or all candidates, while for 25%, they reported having prepared equivalent differentiated tests. About three-quarters of the committees report the presence of candidates with SEN, and 80% of these committees state that they have used permitted compensatory tools for all or some of these candidates. About a third of the committees with candidates with special needs adapted their evaluation grids for them, as allowed by regulations.

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**Annamaria Romano**, graduated in Education Sciences and Primary Training. He is a Primary School teacher at the Istituto Comprensivo Perugia 6. He is part of the Headmaster's Staff and performs the Instrumental Function of the Institute's Evaluation and Self-evaluation area. He is tutor of the trainees of the Faculty of Primary Education of the University of Perugia. In the school he belongs to, he is a teacher trainer and promotes experiments in the logical-mathematical field. He has collaborated with theUSR of Umbria on research-action projects on Learning Disability.

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**Daniela Ruffolo** School Headmistress since 2010, she is graduated in Russian language and literature. A secondary school English teacher from 1994 to 2010, she is a teacher trainer and Marchio Saperi auditor. She is the principal of Don Milani-Linguiti Comprehensive School of Giffoni Valle Piana, appointed as Senza Zaino School HUB for community pacts.

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**Carla Sermasi** Teacher, academic tutor, with multi-year management roles in Emilia Romagna, she's working with-evaluation and improvement in schools. He coordinates internship workshops for university students and has shared professional development agreements for new teachers. He has thirty years of professional experience.

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**Francesca Storai** is a researcher at INDIRE. She has dedicated herself to the study of innovative training models for teachers and school managers. She has deepened her research on methods and tools for the elaboration of the Improvement Plan and on didactic innovation.

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**Daniela Torti** holds a PhD in social sciences in the sociology curriculum. Since 2017 she has been collaborating with INVALSI where since 2019, as a technical collaborator, she carries out qualitative-quantitative research activities in the School Evaluation Area. Since 2023 she has been a member of the editorial board of the Franco Angeli INVALSI series for Research.

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**Ester Valloreo** is a Mathematics and Physics teacher. He has worked as a member of the support staff in the office of the Principal for several years. As the school INVALSI representative, she is in charge of analysing and interpreting INVALSI data in order to improve students' learning levels.

**Sara Vergallo** has a Bachelor in Natural Sciences and is now a student in Master programme "Biogeosciences: analysis of ecosystem and science communication" at the University of Milan; her thesis project is on inclusive mathematics teaching. She worked as environmental guide, tutor specialised in students with learning disorders, substitute teacher of mathematics in Middle school.

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**Pasqualina Maria Zaccheria**, was born in Maropati in the province of Reggio Calabria in 1962, completed her high school and university studies in Messina, where in 1984 she graduated in literary subjects, in 1991 she passed the competition for university researcher in general pedagogy and teaching at the University of Salerno, but continues the career path that began at 18 as a teacher in various school levels and levels; he taught 5 years in basic school and 15 in high school. From 2007 to 2015 he directed the "Giuseppe Renda" Higher Education Institute in Polistena, from 2016 to 2019 he held the position of technical manager at the U.S.R. for Calabria and in the 2018/2019 period also that of manager of the Territorial Area of Reggio Calabria and Vibo Valentia. From 2019 to 2022 School Director at the IIS "Einaudi Alvaro" in Palmi, from June 2022 Technical Director at the USR for Calabria.