# The role of standardised tests: Perceptions of primary school teachers

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**Abstract:** This study explores Italian primary school teachers' beliefs and perceptions regarding the role and relevance of national standardised mathematics assessments (INVALSI) and their influence on classroom practice. Building on the national research project MaSt – Mathematics Standardised Assessment as a Tool for Teachers' Professional Development, this research adopts a bottom-up approach, promoting the formative use of standardised test frameworks and results by teachers themselves. The data derive from a questionnaire administered to 126 in-service primary school teachers across Italy. Teachers declared an influence of the tests on their teaching despite also reporting negative or skeptical views about their usefulness. This discrepancy, along with misconceptions about test data access, underscores the need for targeted professional development. The findings offer insights into teachers' cognitive and emotional engagement with standardised assessments and support the development of resources that align national testing practices with formative, teacher-led educational strategies.

**Keywords:** standardized assessment, perceptions, beliefs, teaching practices, primary school teachers.

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## 1 Introduction and theoretical background

Standardised assessments are carried out in several countries, influencing national debates on education and shaping educational policy and reforms (Kanes et al., 2014; OECD, 2017). Their frameworks and items suggest what is considered relevant in mathematics education at specific school levels, and they also affect teachers' pedagogical decisions at the classroom level (Di Martino & Signorini, 2019).

Several studies in mathematics education research investigate the role and influence of standardised assessment from different perspectives (e.g., De Lange, 2007; Meinck et al., 2017; Suurtamm et al., 2016). While some works adopt a critical stance (e.g., Kanes et al., 2014), others emphasise how standardised tests can be leveraged to support teaching practices. For instance, Doig (2006) argues that the tests, along with the data they generate and the subsequent analysis, can be effectively utilised for both educational and research purposes.

Despite the variety of works, most studies adopt a cognitive and epistemological perspective, with limited attention paid to teachers' emotions and beliefs in relation to the standardised tests (Di Martino & Signorini, 2019). In this work, we acknowledge the strong influence of affective factors on teachers' practices, and aim to contribute by filling this research gap, focusing on our national context.

In Italy, national standardised assessment is carried out by the National Institute for the Evaluation of the Education and Training System (INVALSI), with the main purpose of evaluating the Italian educational system. The tests have been conducted since 2008 and concern both primary and secondary schools, for grades 2, 5, 8, 10 and 13 (INVALSI, 2018). INVALSI mathematics tests are developed by a commission comprising experienced teachers, educational and disciplinary experts, researchers, and statisticians. The tests align with the Italian National Guidelines and aim to reconcile the requirements of large-scale assessments with current research paradigms in mathematics education (Ferretti et al., 2020).

Each year, schools receive a report comparing their results with those of similar institutions. This feedback provides an opportunity to reflect on teaching and learning processes (Bolondi et al., 2024), though teachers are often unaware of the potential value of these data (Dello Iacono & Spagnolo, 2024).

Regarding the affective dimensions, Signorini and colleagues (Signorini, 2017; di Martino & Signorini, 2019) investigate teachers' attitudes towards the INVALSI test through a questionnaire. They show that teachers associate a range of emotional reactions with INVALSI mathematics tests, from anxiety and skepticism to curiosity (Signorini, 2017). These emotions are linked to perceived adequacy, usefulness, and the educational effects of the standardised assessments (di Martino & Signorini, 2019). Moreover, teachers' negative dispositions vary widely, ranging from principled opposition to standardised testing to more specific critiques of particular aspects.

Ferretti et al. (2020) explore teachers' perceptions of the impact of INVALSI tests on their teaching practices, exploring their *espoused beliefs* (Cross, 2009). Their study shows that teachers believe INVALSI tests influence their choices regarding learning activities, assessment tools, teaching methodologies, and curriculum implementation. However, given the small sample size (22 participants), the authors call for further research on the topic.

## 2 MaSt project and research questions

Our study contributes to this line of research by presenting theoretical outcomes from the Italian research project "MaSt - Mathematics standardised assessment as a tool for teachers' professional development". This project aims to develop both theoretical and practical tools to support teachers in using national mathematics assessments for their professional growth (Bolondi et al., 2025; Viola et al., 2024).

There is an ongoing debate on how test results can be meaningfully used at the classroom level, particularly regarding their integration into both summative and formative assessment processes (Looney, 2011).

Traditionally, the impact of standardised assessments has been top-down: tests results influence public discourse, affect policymaking, and reshape structural components of the education system (curricula, teacher recruitment, training). Only at a later stage do these effects reach individual teachers. The innovation at the heart of our research project lies in reversing this logic. Funded by the Italian government, the project promotes a bottom-up approach: INVALSI frameworks, tests, and results are used directly by teachers as resources for formative assessment and personalised instruction, rather than relying on a systemic reform to filter down.

Within this perspective, teachers play a central role, as they are key mediators of classroom-level impact (Spagnolo & Andrà, in press), particularly with regard to their affective dispositions towards INVALSI tests and their application in teaching practice. Previous studies have demonstrated that teachers' affective dispositions significantly influence instructional behaviours and their openness to curricular innovation. However, research exploring their views on standardised assessments remains limited.

Building on these different aspects, this preliminary study investigates two research questions focusing on the primary school level:

1. How do in-service primary school mathematics teachers perceive the role and relevance of standardized national tests (INVALSI) and what are the declared reasons to justify their perceptions?
2. How do in-service primary school mathematics teachers perceive the influence of standardized national tests on their stated teaching practices?

## 3 Method

The MaSt project led to the construction of an investigative questionnaire that was administered to pre-service and in-service teachers of all three school levels (primary school, junior high school, and upper high school). The questionnaire aimed to provide a comprehensive view of how teachers engage with standardised assessments both cognitively and affectively, within the broader context of their professional development. The questionnaire was anonymous and was distributed via Google Forms with the aim of reaching a wide and varied sample of teachers. Teachers voluntarily participated in the study. In this contribution, we focus only on the answers submitted by in-service teachers of primary school (grades 1–5). The sample consists of 128 teachers from all over Italy.

At the beginning of the questionnaire, teachers were asked to provide some personal and professional background information.

The second section of the questionnaire focused on specific INVALSI items, which were selected for their characteristics, such as being suitable to illustrate some national macro-phenomena or the percentage of correct answers. The questionnaire for primary school teachers contained only primary school tasks. Each INVALSI task was followed by some questions aimed at investigating teachers' awareness of possible students' mistakes and their causes, the possible use of the task in classroom practices and assessment, their consistency with curriculum guidelines and the opinion about the wording of the task and its influence on students' answers.

In the third part of the questionnaire, teachers answered some transversal questions. These were not directly tied to individual test items, but rather sought to investigate teachers' general beliefs and understandings regarding the use of INVALSI resources. In particular, this part of the questionnaire explored how teachers interpret the potential usefulness of the information provided by large-scale assessments and what impact, if any, these tools have on their current teaching practice or their intentions for future instructional decisions. By combining item-based analysis with more general reflections, the questionnaire aimed to provide a comprehensive view of how teachers engage with standardised assessments both cognitively and affectively, within the broader context of their professional development.

In our analysis, we will focus on the three questions pertaining to the latter section of the questionnaire and their related answers. The first question is a

multiple choice one and it comes with three answer choices, while the other two are open questions:

Q1. Do you think INVALSI tests are useful?
  (a) I think that INVALSI tests are useful directly to me as a teacher.
  (b) I think that INVALSI tests are useful, although not directly to me as a teacher.
  (c) I think that INVALSI tests are not useful at all.
Q2. Why? Justify your choice of answer.
Q3. Do INVALSI tests influence your teaching practice? If yes, how?

These three questions were selected because they allow us to get some preliminary insights into our research questions. The analysis of the answers to the two open questions was carried out by means of a qualitative content analysis (Kuckartz, 2019) which led to the creation of thematic categories for the various answers collected for Q2 and Q3. The coding process was independently conducted by the authors and then jointly revised leading to the creation of 17 categories for the answers to Q2 and 9 for the answers to Q3; eventually, in the last step the categories were revised again. For Q2, they were grouped into 8 macro-categories and the categories were reduced to 16; for Q3, they were grouped into 3 macro-categories (yes, no, I don't know) and then 7 categories were formed for the "yes" macro-category. The same answer could be classified as belonging to more than one category. In the results section, we will indicate the questionnaires with Tn (e.g. T1 = teacher 1). Among the 128 questionnaires collected, two of them were discarded because they were filled in by two non-math teachers; hence, their answers were not informative. Our final sample consists of 126 teachers.

## 4 Results

Answers to Q1 were distributed as follows:

- I think that INVALSI tests are useful directly to me as a teacher. [72]
- I think that INVALSI tests are useful, although not directly to me as a teacher. [33]
- I think that INVALSI tests are not useful at all. [21]

The motivation for such choices, which were provided in their answers to Q2, can be summarized into the following macro-categories:

- **(In)adequacy of the test** [24 answers]. For those who claimed the inadequacy of the national test, two main motivations emerged: 1) the modality and formulation of such a national test [7 answers] as pointed out by T1 "*I believe that the quiz mode with complex questions and multiple answers that can lead to error, is not appropriate as a national assessment test. In addition, many variables remain that can invalidate the final results (suggestions of teachers, transcription errors of students' answers...)*"; 2) the lack of consideration for individual learners' differences, and their social background and context [14 answers], "*they do not take into account the diversity of classes and students. There are children with different experiences, with different language skills, with different families*" [T19]. For those who instead supported the adequacy of the test, they mentioned 3) the connection with the National Guidelines [2] and 4) the reliability of the tasks [1].
- **Subject of the evaluation** [27 answers]. Teachers revealed different beliefs about who is the subject of the evaluation of the INVALSI: students [22], teachers [1] and institutions [4].
- **Inferences on didactic strategies** [27 answers]. Several teachers highlighted the direct influence of INVALSI tests on teaching practices. Categories can be distinguished here: 1) they promote a conceptual mathematical reasoning, "*ensur[ing] that teaching is more oriented towards reflection and reasoning than repetition and that it departs less from everyday reality*" [T9] [10 answers]; 2) they promote the implementation of different teaching strategies, indeed "*They give me the opportunity to reflect on different teaching strategies and more related to skills and encourage me to ask them in class*" [T79] ; 3) the proposed tasks are useful [7 answers]; 4) tasks are useful but only if a certain kind of teaching practices are promoted in the classroom, if the class "*has always been accustomed to practice-related mathematics exercises linked to the concept of laboratory of mathematics*" [T30].
- **Emotional factors** [6 answers]. These answers revealed how INVALSI tests are a source of stress for both teachers and students.

- **Information on the didactic system** [10 answers]. INVALSI results provide information on the didactic system and so they are useful for the didactics of mathematics and the school system. T36 says "*Ideally, the INVALSI tests should support the improvement of the national school system, but their educational impact is left to the individual schools and therefore does not affect them in a widespread way*".
- **Communication of test results** [3 answers]. Three teachers criticized the way in which INVALSI results are shared and communicated: "*During the INVALSI tests I cannot observe the students' solving process*" [T31], "*I have always seen the results projected in graphs at the teaching boards; overall results summarising the whole institute. I have never seen the answers of my students. I would like to see how they responded*" [T33], "*The answers come too late to discuss them with the pupils and reflect on them*" [T92].
- **Informative for teachers** [30 answers]. INVALSI tests can: 1) encourage teachers to reflect on their own teaching and preparation, as pointed out by T12 who acknowledged that "*my preparation is insufficient and the tests have forced me a little to realize this limit*" [24]; 2) give teachers information on how to proceed in their teaching [6], "*based on the analysis of my class and/or individual student's data, I can better calibrate my teaching path"* [T57].
- **Uselessness** [2 answers]. The INVALSI tests are just useless, "*the test is only a method of control and it is not useful because it has to change the way we see and live school. The change must come from within, that is to say from the teachers*" [T97].

Answers to Q3 were instead distributed as: 40 "*No*", 5 "*I don't know*", and 84 "*Yes*". In case of a positive answer, teachers were invited to provide an explanation [only 6 teachers did not provide any]. Main motivations provided were grouped into the following categories:

- INVALSI tasks are used to prepare pupils for the test [11 answers];
- INVALSI tasks are proposed during classes [30 answers];
- INVALSI tests affect in a negative way (e.g. creating anxiety) [3 answers];
- INVALSI tests suggest areas of improvement [4 answers];
- INVALSI tests promote effective didactic strategies [17 answers];

- INVALSI tests are a means of reflection and improvement for teachers [11 answers];
- INVALSI tests influence specific didactic choices of the teacher [2 answers].

## 5 Concluding discussion

The preliminary analysis we conducted so far was focused on the identification of thematic categories rather than identifying correlations between the three different answers provided by the participants. However, some interesting observations could be made. For instance, we could notice that a number of teachers do not acknowledge the influence of INVALSI tests. Fifteen teachers who claimed that "INVALSI are useful directly to them as a teacher", then stated that such tests do not affect their teaching practices, while 11 teachers who claimed INVALSI are useless, actually disclosed that such tests influence their teaching practices, even though not always in a positive sense.

Moreover, some information only partially correct could be detected in their answer. Three teachers criticized the communication of INVALSI results, but, contrary to what they said, they can access students' responses, even though their access depends on the school principal and organization, and not on the INVALSI itsself. These insights suggest a widespread lack of awareness that deserves to be addressed. To conclude, interestingly, many teachers acknowledge a relational view of mathematics promoted by INVALSI and aligned with the curricular Guidelines. Future research will reveal if this is in line with their own vision of mathematics and might be fruitful for the implementation of the bottom-up approach that MaSt is promoting.

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### Author contributions

All authors have read and agreed to the published version of the manuscript.

### Informed consent statement

Informed consent was obtained from all research participants.

### Data availability statement

The data presented in this study are available on request from the corresponding author. The data are not publicly available due to privacy.

### Conflicts of Interest

The authors declare no conflicts of interest.

## References

Bolondi, G., Cibien, M. C., & Spagnolo, C. (in press). How teacher professional development based on Large-Scale Assessment resources can act on teachers' beliefs affecting their teaching practice. *LUMAT-B: International Journal on Math, Science and Technology Education*.

De Lange, J. (2007). Large-scale assessment and mathematics education. In F. K. Lester (Ed.), *Second handbook of research on mathematics teaching and learning,* 2, 1111–1144. Information Age Publishing.

Dello Iacono, U., & Spagnolo, C. (2024). What do teachers think about students' approach to collaborative problem solving? Comparison about teachers' beliefs at different school grades. *LUMAT-B: International Journal on Math, Science and Technology Education*, 9(2), 17. Retrieved from https://journals.helsinki.fi/lumatb/article/view/2491

Di Martino, P., & Signorini, G. (2019). Teachers and standardised assessments in mathematics: An affective perspective. In M. Graven, H. Venkat, A. Essien, Essien & P. Vale. (Eds.), *Proceedings of the 43rd Conference of the International Group for the Psychology of Mathematics Education* (Vol 2, pp. 185–192). PME.

Doig, B. (2006). Large-scale mathematics assessment: Looking globally to act locally. *Assessment in Education: Principles, Policy & Practice, 13*(3), 265–288. https://doi.org/10.1080/09695940601035403

Cross, D. I. (2009). Alignment, cohesion, and change: Examining mathematics teachers' belief structures and their influence on instructional practices. *Journal of Mathematics Teacher Education, 12*(5), 325–346. http://doi.org/10.1007/s10857-009-9120-5.

Ferretti, F., Funghi, S., Martignone, F. (2020). How standardised tests impact on teacher practices: An exploratory study of teachers' beliefs. In C. Andrà, D. Brunetto & F. Martignone. (Eds.), *Theorizing and Measuring Affect in Mathematics Teaching and Learning* (pp. 139–146). Springer. https://doi.org/10.1007/978-3-030-50526-4_14

INVALSI (2018). Bolondi, G., Cibien, M. C., & Spagnolo, C. (Accepted for publication). How teacher professional development based on Large-Scale Assessment resources can act on

teachers' beliefs affecting their teaching practice. *LUMAT-B: International Journal on Math, Science and Technology Education*.

De Lange, J. (2007). Large-scale assessment and mathematics education. In F. K. Lester (Ed.), *Second handbook of research on mathematics teaching and learning,* 2, 1111–1144. Information Age Publishing.

Dello Iacono, U., & Spagnolo, C. (2024). What do teachers think about students' approach to collaborative problem solving? Comparison about teachers' beliefs at different school grades. *LUMAT-B: International Journal on Math, Science and Technology Education*, 9(2), 17. Retrieved from https://journals.helsinki.fi/lumatb/article/view/2491

Di Martino, P., & Signorini, G. (2019). Teachers and standardised assessments in mathematics: An affective perspective. In M., Graven, H., Venkat, A., Essien & P., Vale. (Eds.), *Proceedings of the 43rd Conference of the International Group for the Psychology of Mathematics Education* (Vol 2, pp. 185–192). PME.

Doig, B. (2006). Large-scale mathematics assessment: Looking globally to act locally. *Assessment in Education: Principles, Policy & Practice, 13*(3), 265–288. hhttps://doi.org/10.1080/09695940601035403

Cross, D. I. (2009). Alignment, cohesion, and change: Examining mathematics teachers' belief structures and their influence on instructional practices. *Journal of Mathematics Teacher Education, 12*(5), 325–346. http://dx.doi.org/10.1007/s10857-009-9120-5.

Ferretti, F., Funghi, S., Martignone, F. (2020). How standardised tests impact on teacher practices: An exploratory study of teachers' beliefs. In C. Andrà, D., Brunetto & F., Martignone. (Eds.), *Theorizing and Measuring Affect in Mathematics Teaching and Learning* (pp. 139–146). Springer. https://doi.org/10.1007/978-3-030-50526-4_14

INVALSI (2018). *Quadro di riferimento delle prove di INVALSI di matematica* [Reference framework for mathematics INVALSI tests]. Retrieved from https://invalsi-areaprove.cineca.it/docs/file/QdR_MATEMATICA.pdf

Kanes, C., Morgan, C. & Tsatsaroni, A. (2014). The PISA mathematics regime: Knowledge structures and practices of the self. *Educational Studies in Mathematics, 87*(2), 145–165. https://doi.org/10.1007/s10649-014-9542-6

Kuckartz, U. (2019). Qualitative text analysis: A systematic approach. Compendium for early career researchers in mathematics education, In G. Kaiser (Ed.), *Proceedings of the 13th International Congress on Mathematical Education. ICME-13 Monographs*. Springer. https://doi.org/10.1007/978-3-030-15636-7_8

Looney J.W. (2011). *Integrating formative and summative assessment: Progress toward a seamless system?*, OECD Education Working Papers, 58, OECD Publishing.

Meinck, S., Neuschmidt, O., Taneva, M. (2017). Workshop theme: "Use of Educational Large-Scale Assessment Data for Research on Mathematics Didactics". In G. Kaiser (Ed.), *Proceedings of the 13th International Congress on Mathematical Education. ICME-13 Monographs*. Springer. https://doi.org/10.1007/978-3-319-62597-3_132

OECD (2017). *Debate the issues: Complexity and policy making*, in P. Love & J. Stockdale-Otárola. OECD Insights, OECD.

Signorini, G. (2017). Teachers' affect towards the external standardised assessment of students' mathematical competencies. In C. Andrà, D. Brunetto, E. Levenson, & P. Liljedahl (Eds.), *Teaching and learning in maths classrooms* (pp. 277–287). Springer.

Spagnolo, C., & Andrà, C. (2025). Perceived difficulty of a mathematical task: Do in-service and pre-service teachers have a common view? In M. Bosch, G. Bolondi, S. Carreira, C. Spagnolo, & M. Gaidoschik (Eds.), *Proceedings of the Fourteenth Congress of the European Society for Research in Mathematics Education (CERME14)*. Free University Bozen-Bolzano and ERME.

Suurtamm, C., Thompson, D. R., Kim, R. Y., Moreno, L. D., Sayac, N., Schukajlow, S., Silver, E., Ufer, S., & Vos, P. (2016). *Assessment in mathematics education: Large-scale assessment and classroom assessment*. Springer Nature.

Viola, G., Ferretti, F., Gambini, A., Martignone, F., Soldano, C., Spagnolo, C. (2024). Teachers' professional development and mathematics LSA: First result of national project. In T. Evans, O. Marmur, J. Hunter, G. Leach & J. Jhagroo (Eds.), *Proceedings of the 47th International Group for the Psychology of Mathematics Education* (Vol. 1, pp. 223–224). Auckland, New Zealand: PME.

[Reference framework for mathematics INVALSI tests]. Retrieved from https://invalsi-areaprove.cineca.it/docs/file/QdR_MATEMATICA.pdf

Kanes, C., Morgan, C. & Tsatsaroni, A. (2014). The PISA mathematics regime: Knowledge structures and practices of the self. *Educational Studies in Mathematics, 87*(2), 145–165. https://doi.org/10.1007/s10649-014-9542-6

Kuckartz, U. (2019). Qualitative text analysis: A systematic approach. Compendium for early career researchers in mathematics education, In G. Kaiser (Eds.) *Proceedings of the 13th International Congress on Mathematical Education. ICME-13 Monographs*. Springer. https://doi.org/10.1007/978-3-030-15636-7_8

Looney J.W. (2011). *Integrating formative and summative assessment: Progress toward a seamless system?*, OECD Education Working Papers, 58, OECD Publishing.

Meinck, S., Neuschmidt, O., Taneva, M. (2017). Workshop theme: "Use of Educational Large-Scale Assessment Data for Research on Mathematics Didactics". In G. Kaiser (Eds.) *Proceedings of the 13th International Congress on Mathematical Education. ICME-13 Monographs*. Springer. https://doi.org/10.1007/978-3-319-62597-3_132

OECD (2017). *Debate the issues: Complexity and policy making*, in P. Love & J. Stockdale-Otárola. *OECD Insights*, OECD.

Signorini, G. (2017). Teachers' affect towards the external standardised assessment of students' mathematical competencies. In C. Andrà, D. Brunetto, E. Levenson, & P. Liljedahl (Eds.), *Teaching and learning in maths classrooms* (pp. 277–287). Springer.

Spagnolo, C., & Andrà, C. (2025). Perceived difficulty of a mathematical task: Do in-service and pre-service teachers have a common view? In M. Bosch, G. Bolondi, S. Carreira, C. Spagnolo, & M. Gaidoschik (Eds.), *Proceedings of the Fourteenth Congress of the European Society for Research in Mathematics Education (CERME14)*. Free University Bozen-Bolzano and ERME.

Suurtamm, C., Thompson, D. R., Kim, R. Y., Moreno, L. D., Sayac, N., Schukajlow, S., Silver, E., Ufer, S., & Vos, P. (2016). *Assessment in mathematics education: Large-scale assessment and classroom assessment*. Springer Nature.

Viola, G., Ferretti, F., Gambini, A., Martignone, F., Soldano, C., Spagnolo, C. (2024). Teachers' professional development and mathematics LSA: First result of national project. In T. Evans, O. Marmur, J. Hunter, G. Leach, & J. Jhagroo (Eds.). *Proceedings of the 47th International Group for the Psychology of Mathematics Education* (Vol. 1, pp. 223–224). Auckland, New Zealand: PME.