Teacher education is a deeply pedagogical process rooted in values, ethics, and the social purpose of schooling. Globally, it sits at the core of educational quality and fairness, as research in comparative and international education demonstrates: the training of teachers directly influences students' learning chances, social inclusion, and the democratic aims of schools. Teachers are not simply transmitters of curricula, but active professionals whose convictions, reflective skills, and ability to manage the complexities of classroom life give shape and substance to the educational experience itself.

The pedagogical dimension of teacher education frames teaching as a relational, context-aware, and ethically grounded profession rather than just a set of procedural skills. From a research perspective, this demands robust research methodologies that can critically examine the complex realities of schools and inform evidence-based policies. Equally important is the connection between theory and practice, which helps to bridge the persistent gap between universities and schools.

The contributions gathered in this volume reflect the richness and diversity of experiences showcased during the ATEE Spring Conference 2024, held at the University of Bergamo from May 29 to June 1, 2024. The volume presents 70 selected papers out of more than 300 presented by researchers representing over 40 countries.

This broad spectrum of studies highlights promising directions that can inspire renewed inquiry and concrete proposals aimed at improving contemporary educational systems.

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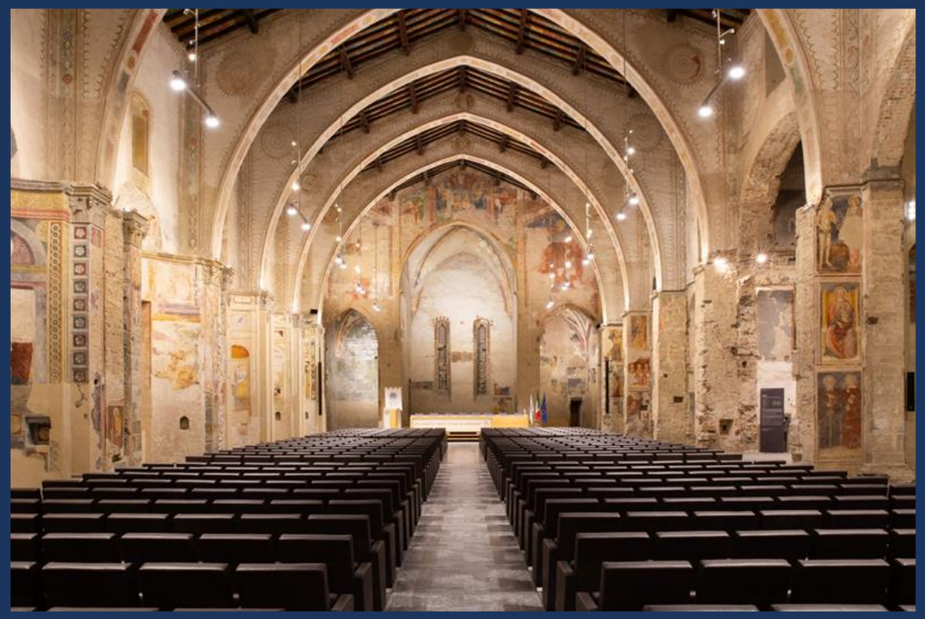

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BOOK OF PROCEEDINGS

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A formative assessment framework to develop primary school pre-service and in-service teachers' video analysis programs

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Abstract

Formative assessment (FA) is a valuable means to sustain students' achievement of learning goals. Indeed, research has shown a positive effect of FA on students' learning in primary, secondary and higher education, although the debate is still open. In line with these suggestions, the contribution describes a FA framework and a related system of items useful to guide teachers' observation during video analysis activities within professional development programs for in-service and pre-service teachers. The system contains over 100 items divided into areas corresponding to FA strategies described in the literature. It provides teachers and students with the opportunity to notice their own and their peers' assessment practices and to reflect upon them to support students' learning processes.

Keywords: teachers' professional development programs; video analysis; observation; formative assessment; system of items.

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[1] The presentation has been developed equally by each author, while this contribution has been written by Alessandro Oro and Elisa Guasconi.

1. Introduction

Intended as a strategy to support and enhance student learning, formative assessment (FA) is currently a central element of educational policies worldwide (Birenbaum et al., 2015). Despite evidence of its effectiveness, teachers often struggle to implement FA strategies effectively, and its application frequently falls short of the standards necessary to make it beneficial in school practice (Baird et al., 2017; Yan & Brown, 2021).
In the Italian context, due to historical and educational policy reasons (Vannini, 2023), a widespread culture of formative assessment practices among teachers is still lacking. Specifically, Italian primary school teachers tend to think of assessment in a traditional manner and show limited knowledge of what FA entails (Pastore et al., 2019). Based on these findings, there is an evident need for targeted training on this topic to prepare both future teachers and those already in service. In this regard, it is crucial to promote teacher change of assessment practices by proposing teachers to reflect on their educational experiences.
Building on these premises, the proposed contribution describes a FA construct and its related system of items, a kind of instrument that does not yet exist in Italian language, and which could prove useful as a tool to support the initial and in-service teachers training. Initially conceived as a guide for use during training activities involving video analysis in pre-service teacher education programs focused on formative assessment, this system includes a definition of formative assessment and procedures organized into five strategies.

2. The ongoing debate on FA

Formative assessment refers to a set of activities aimed at eliciting evidence about students' learning, so that both students and teachers can use it to adjust their teaching and learning processes. By reading this general definition, it is easy to comprehend that the concept covers a wide variety of practices (McMillan et al., 2013): this is reason why in the literature the debate on FA framework is still open, and it is difficult to establish an unequivocal definition.
Currently, at least three distinct terms can be identified in the literature, each representing a different approach on FA. The first is "Formative Assessment", a term rooted in Bloom's (1971) theories and further developed by Black and Wiliam (1998). This concept refers to a continuous process occurring during teaching and learning, aimed at monitoring student progress and providing immediate feedback to improve instruction and learning. In this framework, the role of teachers is crucial because they identify areas where students may face difficulties and adjust teaching strategies accordingly.
The second term, "Assessment for Learning" emphasizes the intentions behind the use of assessment to support learning rather than describing specific actions (Wiliam, 2018). This approach encompasses actions to foster an environment where assessment is an integral component of the learning process.
The third term, "Assessment as Learning," focuses on the active role of students in the assessment process. In this approach, students are encouraged to reflect on their learning, monitor their progress, and use feedback to self-regulate and adjust their study strategies (Earl, 2004).
Furthermore, depending on the degree of premeditation, FA activities can be positioned along a continuum ranging from *informal* (embedded within everyday classroom interactions) to *formal* practices (pre-designed, systematic activities aimed at evaluating specific learning objectives) (Ruiz-Primo & Furtak, 2006). Formal FA typically involves planned activities or tools, such as quizzes or assignments, that are systematically implemented to evaluate student achievement. Informal FA occurs dynamically within the flow of classroom interactions. It involves ongoing strategies that help teachers acquire immediate information from students, which can be promptly used to adjust instruction. Particularly relevant for this approach are the *assessment conversations* (Ruiz-Primo, 2011), interactive dialogues between teachers and students focused on eliciting and interpreting evidence of students' understanding during the flow of instruction.

Within this landscape, it is possible to identify some of the trajectories that the debate on the FA framework is currently taking. In recent years, more attention has been given to promoting students' self-regulation skills stressing the relevance of involving students in the assessment process, and to ways for developing and delivering feedback (Lipnevich & Panadero, 2021; Lui & Andrade, 2022). In addition, a special and renewed attention to the needs of students emerges through personalization and reflecting on socio-culturally responsive assessment practices (Bennett, 2023) and, at the same time, recent studies emphasize the evolution of FA within emerging contexts such as digital learning and AI-supported instruction (Hopfenbeck et al., 2023). Furthermore, concerning effectiveness of FA practices in enhancing student learning, there is an ongoing in-depth debate (Bennett, 2011; Briggs et al., 2012; Kingston & Nash, 2011), but recent studies suggest that they have a positive impact across various disciplines, though the intensity of the effect may vary (Lee et al., 2020).
Such a variety of perspectives and research is bringing the issue of the definition of FA back to light (Andrade et al., 2019) together with the lack of that "theory of action" claimed by Bennett (2011). What is formative assessment? Which strategies do it include? Starting from these questions, we have developed a tool that enables teachers to acquire basic to advanced literacy of formative assessment practices and methods for operationally defining formative assessment.

3. The origins of the FA system

Even though the debate on the framework and the existing evidence on effectiveness is still open, the literature claims that FA, if used on a regular basis, allows teachers to collect information on students' learning and to adjust their teaching activities. This adjustment is precisely what students deserve to overcome eventual difficulties in achieving learning goals and to improve their skills, so the ability to develop FA moments and tasks, to provide students with feedback, and to use information to regulate teaching is a crucial tool in the "baggage" of the teachers, whatever their school grade would be. Anyway, changing pre-service and in-service teachers' assessment practices implies transforming also their beliefs, and this needs adequate time, a collective participation of teachers and, above all, a closer look into everyday teaching practice (Clarke & Hollingsworth, 2002; Darling-Hammond, 1995; Guskey, 2002). In this respect, reflecting on classroom situations with an expert's support could allow teachers to analyze their practices, find ways to improve them, and see the effects on students' learning. These were the assumptions of the VAHE project from which the FA system of items, the focus of this contribution, was born.

3.1. The VAHE project

Video analysis for quality teaching in Higher Education (VAHE) (Ciani et al., 2021; Rosa, 2024) has been carried out by a group of researchers from the Department of Education Sciences of the University of Bologna with the collaboration of the School of Education at University of California, Irvine and the University of South Australia, and the technological support of the Media Education Lab of the Department.
The project aimed to increase the quality of teaching in higher education by developing a professional development program for in-service university teachers based on the use video analysis methods. In particular, the focus of the training was on FA strategies.
First, an online platform was developed through which university teachers could watch their peers' videos while taking a class and reflect on specific events. In this phase, to help teachers in identifying implemented FA strategies, a construct of "Informal Formative Assessment for quality teaching in Higher Education" and a correspondent system of behavioral indicators was developed (0' Keeffe et al., 2020). Assuming the distinction between formal and informal FA, researchers explained that the choice of focusing specifically on the informal one was due to the evolutions of the debate regarding FA, which tends to enhance the use of *minute-by-minute* strategies, and to the characteristics of higher education contexts, such as the high number of students and the frequency of classes. The construct was structured in four sections (Rosa, 2021): *structuring:* share the learning goals, contents, and activities to give students the opportunities to self-regulate their process; *eliciting:* collect evidence of students' learning through interactions and questions; *reacting/using:* respond,

reflect, provide students with feedback, and encourage self and peer assessment; *learning climate:* use of a supportive communication and value students' contributions. For each of these dimensions, items were developed containing actions made by the teacher and they were then put into an online platform for video analysis and video annotation activities. University teachers, with the support of researchers, used the framework to identify actions and specific moments in a few videos; this operation led them to reflect upon teachers' practices and students' reactions and to interpret the situation employing their knowledge; at last, it brought them to decide how to improve the effectiveness of the implemented strategies for sustaining students' learning.
The project's second phase consisted of an evaluative study of the professional development program's effectiveness. We will not delve into this research, but we want to mention that the program significantly increased perceptions of FA knowledge and abilities of the participants (13 engineering teachers). At the end of the project, a growing interest emerged toward the use of video analysis techniques also in pre-service teachers' programs to foster the development of reflective habits and FA skills. In a short time, the research group, to which the authors of this contribution belong, has started to plan a new experimental study to explore the effectiveness of video analysis methods in Primary Teacher Education Degree Course at the Department of the Education Sciences of the University of Bologna. Thanks to the collaboration with SmaIL Lab, a renewed online platform for video analysis activities has been developed. At the same time, a new construct and system of items regarding FA in primary school was elaborated, whose structure is described in the following paragraph.

4. The FA system of items

We start by describing FA as "*an intentional process through which the teachers gather information about students' learning and interpret it to adjust their teaching and learning process. Teachers adopt formal and informal approaches and tools of information gathering, depending on the specific characteristics of the subject area, and use them to redesign instructional activities. They pay attention to adjusting teaching to each student's needs and provide all of them with feedback (consisting of strengths, weaknesses, and strategies for improvement) aimed at leading them to the established learning goals. During this process, students can reflect on the gap between "where they are" and "where they need to go," also through moments of self-assessment and peer evaluation.*"
By reading this definition, it is possible to catch some peculiar traits of FA concept. First, it refers to an *intentional* process, meaning that teachers know the learning objectives they are monitoring and the tools and techniques they have decided to use to collect information. Second, it includes *both formal and informal approaches* and techniques of FA, since in primary school teachers should use both depending on the circumstances and opportunities. Third, it is *domain specific*. Indeed, it underlines the need to consider each discipline's nature while developing FA moments. Still, it mentions the relevance of *using* inference on the FA results to *adjust* teaching activities and students' learning processes. Lastly, it refers to *each student* encouraging teachers to adopt an individualized approach, able to regulate teaching to every student's needs.
The construct is composed of the strategies described below:

1. Sharing learning goals and assessment criteria;
2. Collecting evidence on student learning by using different tools and approaches;
3. Providing students with formative feedback;
4. Promoting Peer and Self-Assessment;
5. Adjusting teaching and instructional practices.

The construct also includes a transversal element that refers to building a positive learning environment because it guarantees the essential conditions to make formative assessment effective. Starting from this framework, we searched in Italian and international assessment studies coherent and effective practices and techniques and developed a system of items describing teacher's actions. It has different levels: starting with six categories corresponding to elements composing the FA construct, which have been listed above, it continues with sub-categories for each area (Tab. 1).

1st level – Main elements of the construct	2nd level	3rd level	4th level
S) Sharing learning goals and assessment criteria	SG) Sharing learning goals		
	SC) Sharing assessment criteria	SCr) Sharing assessment criteria with rubrics	
		Sci) Sharing assessment criteria through quality indicators	
C) Collection of evidence on students' learning	FC) Formal collection of evidence		
	IC) Informal collection of evidence	ICq) Informal collection through questions and interactions	
		ICf) Informal collection through fast FA techniques	
P&S) Peer and self-assessment	P) Peer assessment		
	S) Self-assessment		
F) Formative feedback	IF) Individual feedback	Ifo) Oral individual feedback	
		Ifw) Written individual feedback	
	CF) Collective feedback	CFf) Collective Feedback (Formal FA)	
		CFi) Collective Feedback (Informal FA)	CFiq) Collective feedback after IFA through questions and interactions.
			CFif) Collective feedback after IFA through fast FA techniques
Ad) Adjusting teaching			
LE) Learning Environment	LEm) Effective practices toward the mastery of learning objectives		
	LEe) Embracing errors as learning opportunities		
	LEt) Trust in each student's abilities		
	LEl) Calm and adequate learning environment		

Table 1: The structure of the FA system of items.

Two examples of items belonging to the "sharing learning goals and assessment criteria" and "collection of evidence" areas are listed below.

- The teacher shares the learning objectives with students through various didactic mediators (iconic, analogical, and symbolic), focusing attention on the use of images, examples, and appropriate and understandable language (both written and oral).
- The teacher emphasizes the formative purpose of the assessment before its administration, paying attention to the use of understandable language.

One of the main strengths of this system is its *mouldability.* To understand this feature, one can consider a scenario involving a video analysis activity. Attention might be directed toward the "collection of evidence" as prompted by the observed situation in the video. If the teacher in the video is collecting evidence of students' learning using informal FA techniques, only the relevant items (IC, informal collection of evidence) would be considered. On the contrary, one limit of the FA construct is the high number of its items (tot. 127). Of course, it is crucial that the system passes through a validation process. In this regard, a structured validation design has been planned and is currently carrying on. It is composed of two main phases: the verification of the system's validity (content and concurrent validity), and the validation of interrater reliability.

5. Which uses of the FA item system in teachers' professional development?

The original purpose of the system was to help teachers analyze videos of FA moments in primary school, so its main use is related to professional development programs for pre-service and in-service teachers, which are based on the employment of video analysis methods. This means it could be used by teachers who observe a video to identify FA strategies in a classroom situation and reflect on them. In this regard, the ability to recognize specific elements in a situation is what literature calls *teacher noticing* (König et al., 2021), one of the most important abilities that distinguishes an expert from a novice teacher and that allows the former to develop a more effective and responsive teaching (Stahnke et al., 2016).

FA construct and its items could also offer a strong reference for in-service teachers who want to implement FA strategies in their classrooms. In consideration of the lack in Italian schools of a proper assessment culture able to improve teaching and educational actions and the confusion on the way FA is implemented and used in classrooms (often mistaken for exercises or an “active” approach to teaching), the system could provide that "theory of action" (Bennett, 2011) they deserve to understand what FA really means. Indeed, it contains different practices who can be used together or separately by teachers, in a conscious manner depending on learning objectives, disciplines and students’ characteristics. Likewise, it could be the content of a program for future teachers who intend to understand how FA could be implemented in primary schools.

Finally, items can also be used as elements of an observation grid, that could be employed to carry out peer observation activities within professional development programs in primary schools, even without using videos. In this case, the trainer could encourage in-service teachers to focus on FA strategies implemented by their colleagues with students, to provide formative feedback and enhance the group of teachers to reflect on which assessment actions they could make to improve students' learning.

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