

## **Formative assessment for daily didactic design**

*The student protagonist*

By

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### **Abstract**

In this article, the issue of the use of *formative assessment* to allow a secondary school teacher to know whether or not students have achieved the set learning objective at the end of the lesson time.

This practice aims to help undermine the idea that school does not really affect the development of students' skills and that, usually, those who start a school cycle presenting difficulties will end it showing, proportionally, the same difficulties.

One of the ways in which *formative assessment* has been spreading in schools in recent years is through the use of new technologies. The latter are revolutionizing teaching practice by allowing, through the tool presented in this article, to be able to know in more detail the learning styles of learners.

The use of this practice allows students to perceive how the teaching proposal is perfected starting from their characteristics. This generates a climate of work and collaboration in the classroom, as each student is the protagonist of what happens.

In addition, this opens up another question: whether it is more appropriate to use a "rigid" teaching methodology or to try to adapt to the characteristics of the class group in what is being taught at that moment.

The article presents the experimentation carried out in the vocational training center "Oliver Twist di Cometa Formazione s.c.s" from which good practices have been identified for the use of *training assessment* at school.

**Keywords:** formative assessment, personalizzazione, feedback, blended learning, mathematics, vocational school.

## **1. Introduction**

School education, which in Italy begins for the child at 5-6 years of age and can end at the age of 16 with the end of compulsory schooling or at 18-19 with the passing of the exam for the acquisition of the state diploma, has as its ultimate objective the social and cultural promotion of each individual, that is, to help the student to develop his talents and to fill any gaps present from the previous training cycle (for example from the middle school for students who start high school).

On the other hand, much literature shows that there is a strong correlation between the student's initial aptitude and his final profit (Sandrone, 2008). Making an educational proposal even for those who show a poor aptitude for school is an essential point for a school that is for everyone.

In the research covered by this article, formative *assessment* (FA) has been used as a possible tool to design an increasingly personalized teaching on the student or on groups of students. In particular, *quizzes* were administered that the students took on their *personal tablet*. This modality questions new technologies and what type of teaching is most appropriate to the complexity of modern classrooms.

## **2. II FA – Litterature Review**

The concept of *formative evaluation* was introduced by Scriven (1967) in an article on the evaluation of school curricula. According to Scriven, formative evaluation was intended to provide data that would allow a subsequent adaptation of new programs during the design and implementation phase (Allal and Lopez, 2005). The concept was developed and explored in subsequent papers during the 1970s (Bloom, 1976; Bloom, Hasting and Madaus, 1971). In these articles, the term evaluation is also replaced and the term assessment is affirmed, as the focus is shifted from the evaluation of the school system to monitoring students' learning in the classroom.

Possiamo indicare come origine della visione moderna del concetto di FA il lavoro di Black and Wiliam che lo definiscono come: “*All those activities undertaken by teacher, and/or by their students, which provide information to be used as feedback to modify the teaching and learning activities in which they are engaged.*” (1998)

The two authors identify four essential components:

- Data on the current level of student learning.
- Reference level data.
- A method for comparing levels.
- A method used to bridge the gap.

A further contribution to the definition of all the elements that make up the modern idea of AF is given by the work of Melmer, Burmaster and James (2008), who describe it as a process of giving *feedback* to suggest changes to both teachers and students in order to promote their learning.

The importance of the feedback moment , i.e. when the teacher communicates the results of the AF is underlined by both Butler (1988) and Dweck (2000): when it is done without grades but only with comments, this encourages students to become *effective learners* committed to improving their learning strategy.

There are many types<sup>1</sup> of AF, some give qualitative results, others more quantitative.

The literature has now reached a certain clarity in defining what types of activities of teachers and students are for educational purposes, i.e. they help teachers to modify their teaching methodology to adapt to the learning path that students are actually taking, although the question is still open whether this methodology actually helps students to achieve their educational objectives. Black and Wiliam (2003) themselves state that in their 1998 paper they were overly positive and that the experiments carried out at school to use AF actually

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<sup>1</sup> Observation, discussion, *peer/self assessment*, questionnaire, *journal*, problem writing by students, etc.

They do not yet allow us to give a definitive judgment on the instrument. This is also echoed and supported by Dunn and Mulvenon (2009) who state that the experiments carried out do not demonstrate a direct correlation between the use of FA and the improvement of student outcomes. The two authors hope that further experiments will be carried out in order to judge the goodness or otherwise of this methodology; the same concern is acknowledged and reinforced by Black (2015). This is the context of this article's contribution: we are within the empirical research on AF. These types of research have been classified into three categories (Allal and Lopez, 2005):

1. Experimental studies on the effects of AF;
2. Development of AF tools and procedures;
3. Teacher studies and their practices using FA.

This work, in particular, is placed in the first category by giving suggestions for a subsequent research project that belongs to the second type.

### **3. Experimentation: methodology and results**

The experimentation covered by this work was carried out at the vocational training center "Oliver Twist – Cometa Formazione scs" in the first (22 students) and second (18 students)<sup>2</sup> classes of the "Wood Operator – Building Maintenance Technician" sector. Two types of experiments were carried out: as far as the first class was concerned, a quiz was administered, through the *class's Moodle* platform, on the mathematics lesson that had just been carried out in the classroom. The students completed this quiz, consisting of multiple-choice exercises, at home as an assignment, the teacher from the analysis of the results obtained designed the next lesson. This first experimentation was called "FA for Everyday Instructional Design".

In the second class, on the other hand, a different experiment was carried out in that the administration of the quiz took place not at the end of an hour of lessons, but at the end of a unit

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<sup>2</sup>The number may change due to students who are absent or have not taken the test.

didactics with the aim of assessing the students' level of learning over a period of two weeks of lessons (7 hours of lessons): in this way we wanted to ascertain if the students were ready to take the test in class. As will emerge later, the results obtained have revolutionized the didactic design: this experiment has been called "FA for personalization".

### **3a. FA for Daily Instructional Design**

In the first class, three quizzes were administered at the end of as many hours of lessons; the next lesson was designed starting from the analysis of the results obtained by the students. The class *e-learning* platform, in fact, in addition to generating a table with the answers of individual students, also builds a histogram in which it is possible to see the distribution of the results obtained by them. In the horizontal axis the students are divided according to the percentage they have done correctly, in particular they are divided into intervals of 5 percentage points, in the vertical axis we can read how many students fall into a particular range.

Figure 1 shows the first histogram generated by the system following a lecture. Analyzing the results, four types of students emerge, identified through the evaluations they obtained (grade between 0 and 100):

1. 0 – 45: students who did not achieve the learning objectives;
2. 45 – 60: students who have understood the topic of the lesson but do not know how to apply it correctly;
3. 60 – 75: students who have followed and understood the whole lesson and know how to carry out some exercises;
4. 75 – 100: Students who have achieved all the objectives of the lesson.

These categories were used to comment on the graphs obtained after the quizzes.

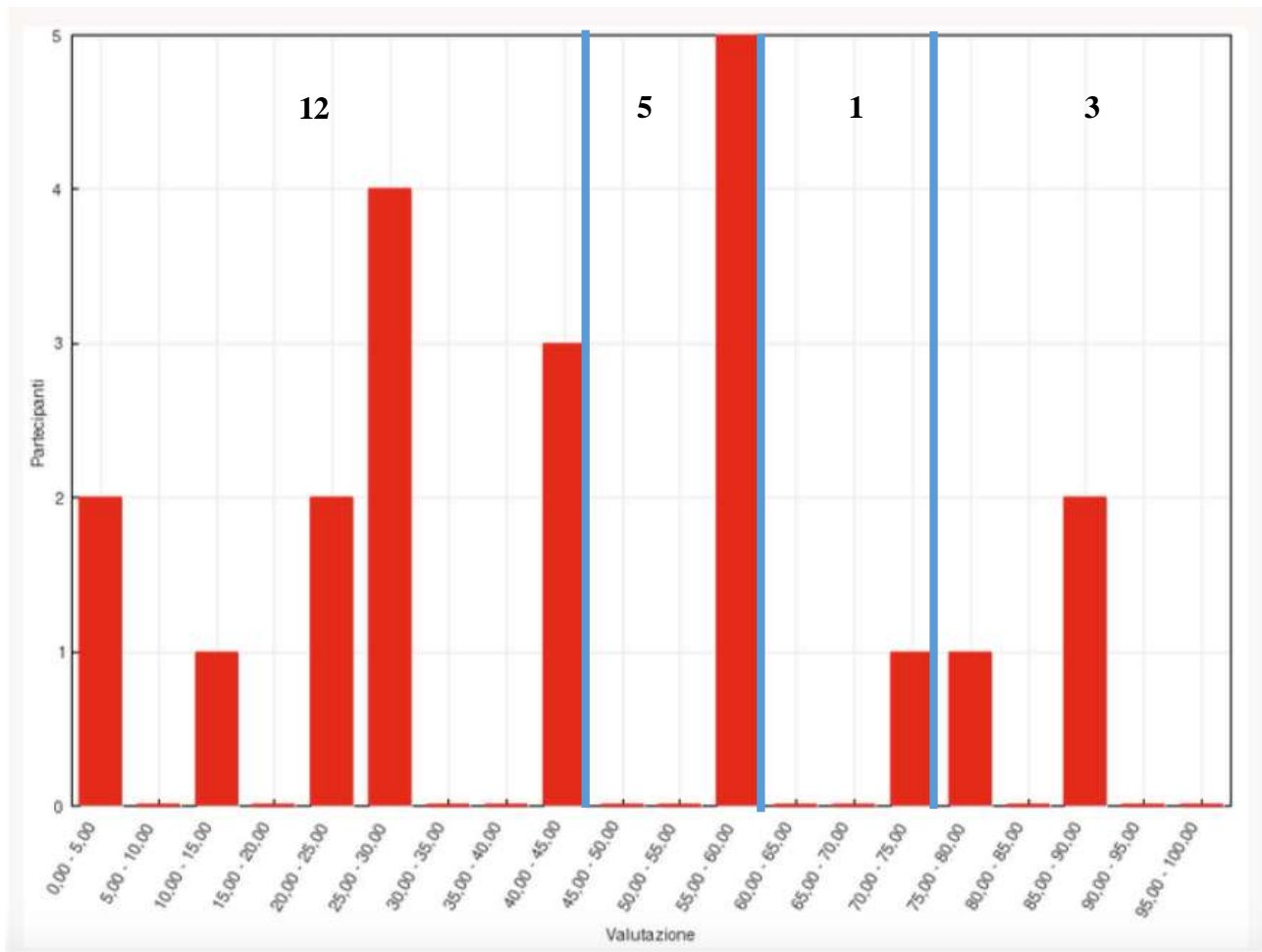


Fig. 1: These results show that the majority of the class had difficulty understanding the lesson.

Looking at these results, it can be seen that most of the class showed difficulty in grasping the objective of the lesson, in fact 81% belong to the first two categories. This result suggested for the next lesson to carry out a participatory correction, in which the students were called to the blackboard starting from the exercises they had failed. This made it possible to answer their questions, to fill in some gaps that had become apparent and to enhance the three students who had achieved an excellent result, asking them to answer some questions from their classmates or to explain again themselves.

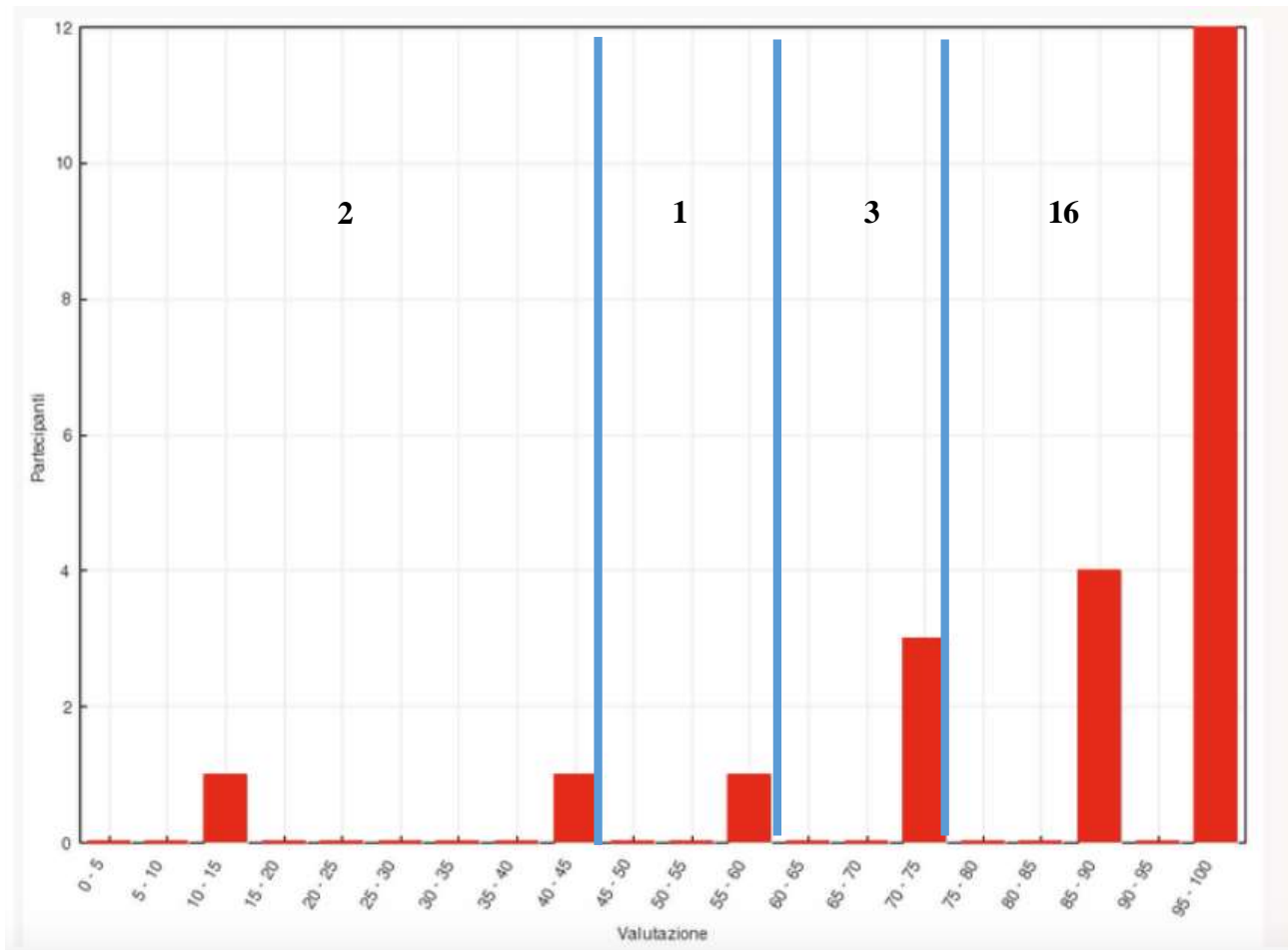


Fig. 2: These results show that the majority of the class achieved the goal of the lesson.

After another explanation on a different topic from the previous one, another quiz was administered as FA, where the results shown in Fig. 2 were obtained. It is easy to see that in this case 86% of the students have reached a sufficient level, of which 73% are even excellent. In this case, it was not appropriate to propose a participatory correction for the next hour, but an in-depth activity was proposed for those students who had achieved the objectives, while the three who showed difficulties worked directly with the teacher, in order to respond to the difficulties that each of them had shown.

To conclude the description of this first trial, the results of a final AF administered to the first class after an explanation are reported (Fig. 3).

Analyzing the results obtained this time, it can be seen that the class has been substantially divided into three blocks, easily identifiable by the histogram and, although 50% have a

belonging to the fourth type, almost all of them were on the lower limit of the same, moreover 6 students did not take the test. It can be deduced that almost half of the class managed to carry out most of the proposed exercises, while the remaining half is divided between those who did not hit the target and those who did not try the test, for the purpose of our analysis we can consider them as students who took the quiz inappropriately.

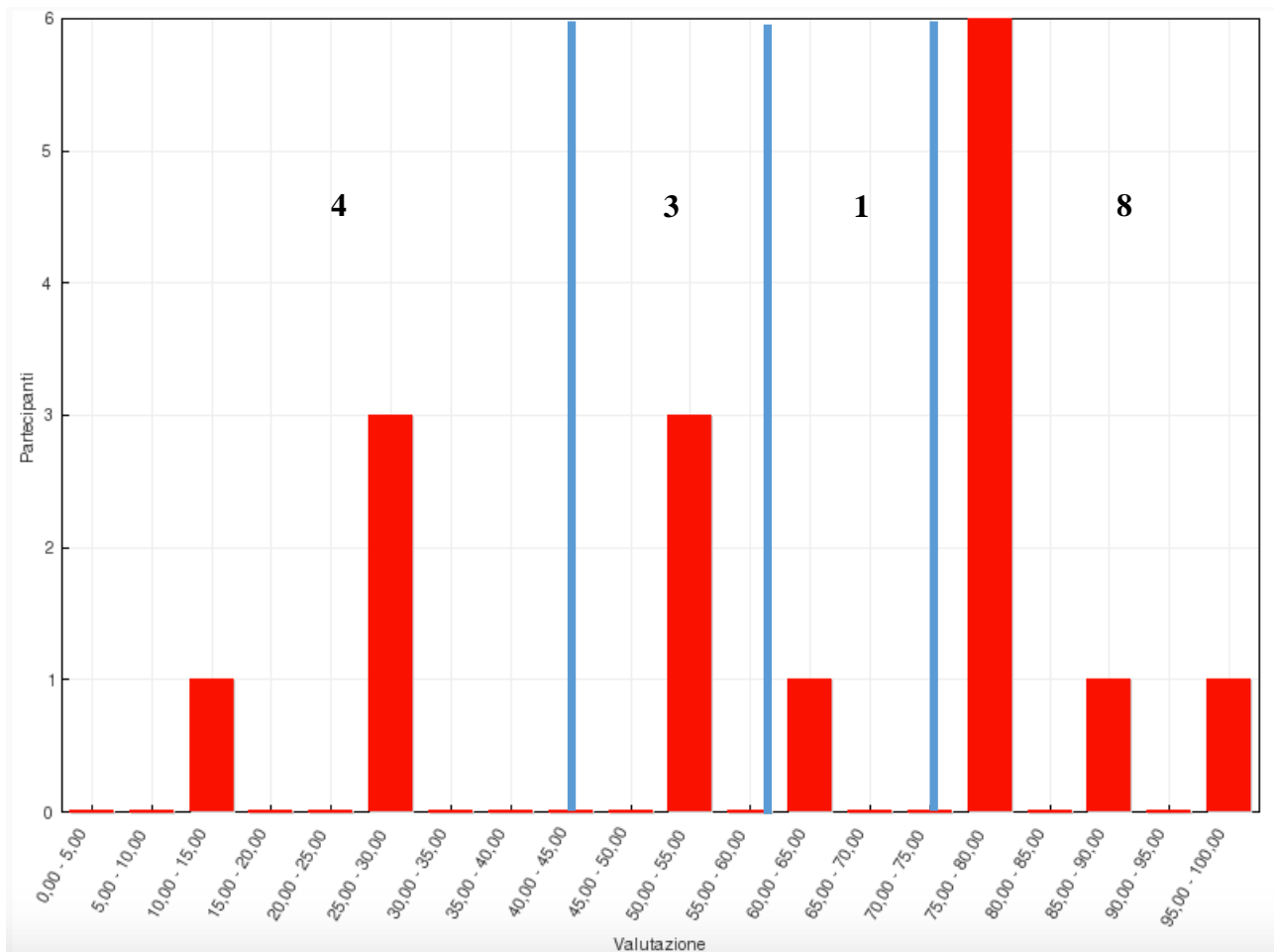


Fig. 3: These results show that the class has essentially split down the middle.

Reading the results obtained by the students, it was decided to propose to them an exercise activity carried out with the *peer-tutoring modality*, i.e. the students with the best results were paired with the students who had shown difficulties, with the aim of helping them to carry out the proposed exercises.

In conclusion, it emerges that the FA can be used by the teacher for the design of the lesson following an hour of explanation; It also emerges that three distributions can be interpreted



of very different results from each other and three consequent possible actions to support and encourage students' learning.

### **3b. FA for customization**

This second trial took place in the second grade and involved 18 students. Unlike the previous experiment, this time the quiz was administered after two weeks of explanation and exercise by the teacher, and was carried out in class. The results obtained are shown in the histogram in fig. 4.

As it is easy to see, the results were very poor, all but 3 students had negative evaluations and most of them strongly negative; However, 2 excellences stand out that have carried out the test perfectly.

This result shows that the teaching method used during the two weeks of explanation was not effective. It was therefore necessary to design re-explanation and exercise activities during the following two weeks; This, however, would not have rewarded the excellent work done by the two members of the class who carried out the quiz perfectly. Not taking this into account would have meant generating frustration and collapse of motivation in students who excelled.

Evaluating the two totally different needs shown by the class, two two-week courses (7 hours) were designed:

- The two excellent students studied, through cards given by the teacher, advanced topics that would not have been addressed in class and on which they would have been evaluated;
- For the rest of the class, two weeks of exercises in small groups were designed with frequent moments of discussion with the teacher.

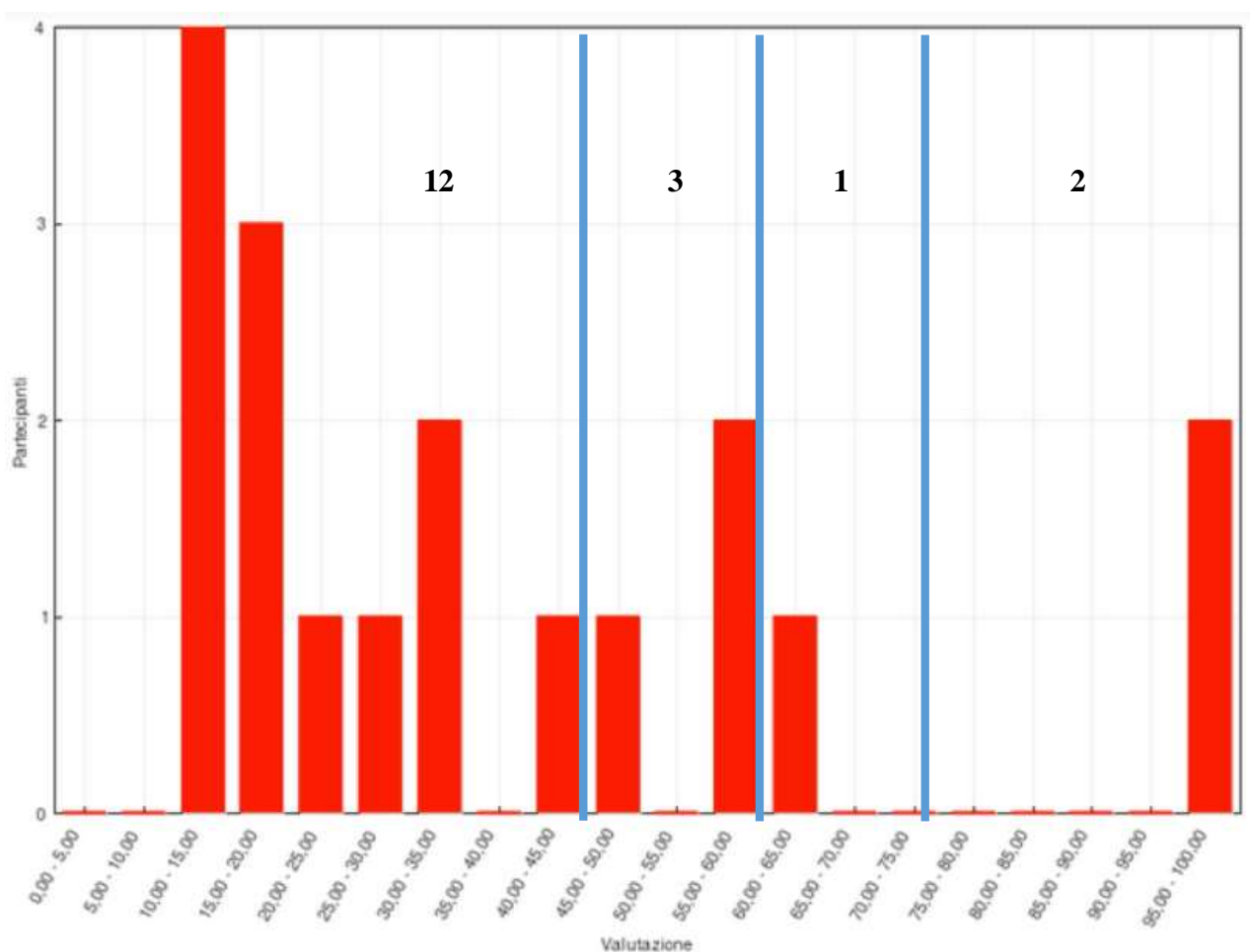


Fig. 4: Results after the first explanation period.

At the end of the two weeks, a new AF was administered, with exercises similar to the previous one (Fig. 5).

Of the sample, 4 students did not take the test, 2 are the students who had already excelled and 2 were absent during the administration of the quiz. It can be seen that now almost all the students have achieved the set educational objectives, apart from a single student who continues to show serious difficulties. For this one student, two hours of remedial with the teacher were provided, but despite this, during the class assignment he did not show any improvement.

These data and this particular behavior of his, where all his classmates had succeeded, made the Class Council suspect that the boy could have an undiagnosed specific learning disorder.

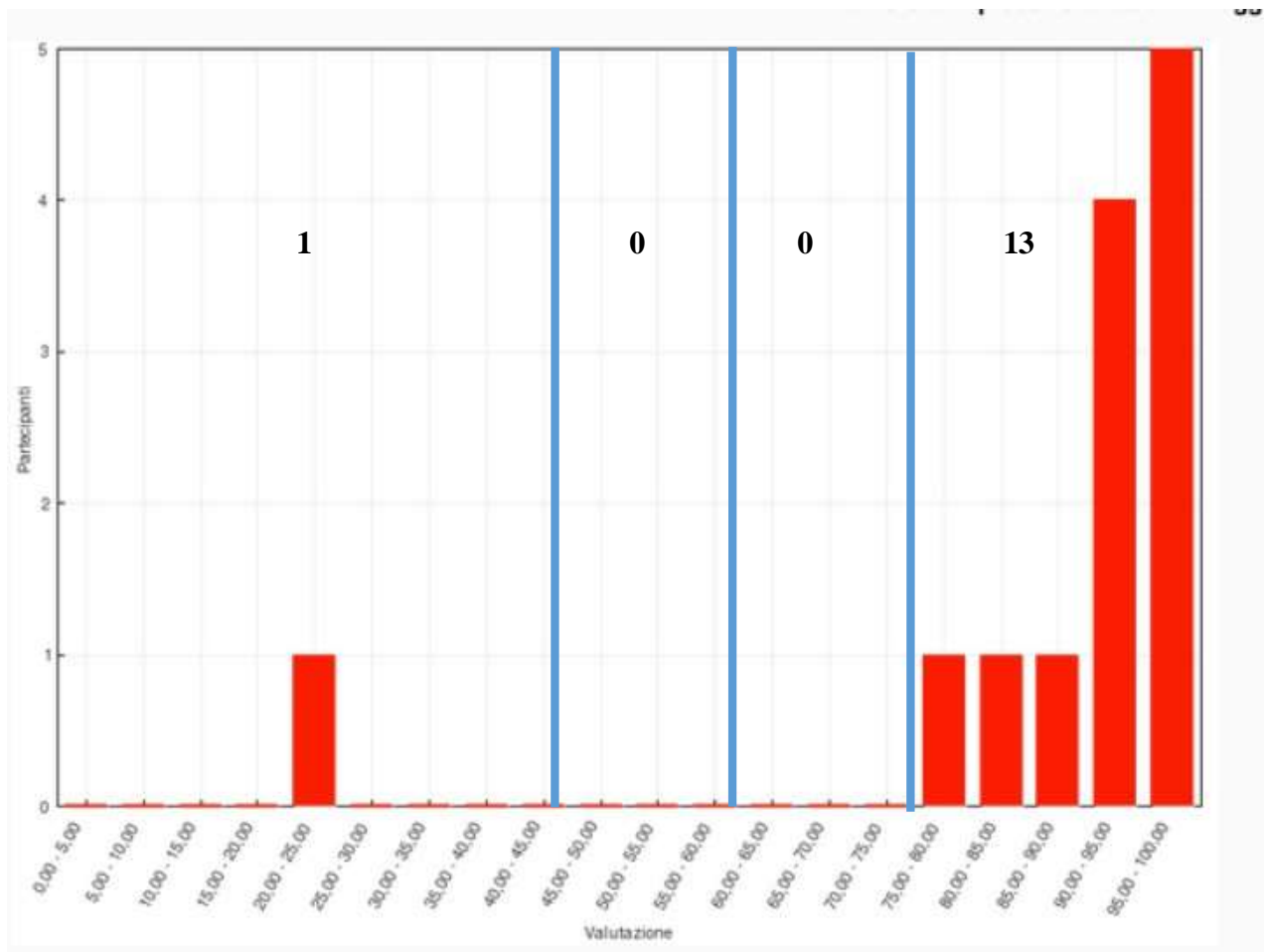


Fig. 5: Results after the second period of explanation and exercise.

The family was summoned and asked to do the necessary tests, which identified a form of dyscalculia. This diagnosis made it possible to design a personalized teaching for him that would help him build his own compensatory tools. The student is now one of the excellences of the class as a result of the specific work done with him.

In this second experiment, it is highlighted how the FA can be a tool to raise questions about students' difficulties, to enhance the excellence of a class and to promptly meet the request for help from students, who often do not ask it explicitly.

#### 4. Conclusions

In this article it has been shown how the FA allows to have quantitative information in a short time on the degree of learning of students compared to the reference standard; Allows

In addition, to evaluate the impact of a teaching strategy and therefore know in more detail which modalities work with a class and which do not. The collection of this data, for the generation of which the digital tool (*Moodle*) is essential as it would be very complex for a teacher to correct all these student papers, allows to conceive, design and implement personalization interventions in a timely manner and that aim to support the learning path of the learners.

Assess your preparation for the class assignment.

<b>Experimentation</b>	<b>Application Phase</b>	<b>Objective</b>
FA for day-to-day instructional design	After an hour of class	Assess students' comprehension. Designing next hour of lesson.
FA for personalisation	After one teaching unit (7 hours)	Assess the level of preparation for the class assignment. Designing personalised paths.

### Peer Tutoring

<b>Distribution of results</b>	<b>Didactic action</b>
Strong imbalance to the left	Collegial Correction
Strong imbalance to the right	In-depth for those who have achieved good results. Personalized intervention for those who have had difficulties.
Uniform distribution	<i>Peer Tutoring</i>

## **5. Upcoming developments**

The results of the experiments carried out, certainly partial and inconclusive, however, trace a path and certainly give some points of reflection for the development of the research:

1. It is necessary to carry out further experiments, with also the presence of control classes in which the tool is not used;
2. An observation protocol will be developed that will allow to:
  - a. Assess students' reaction to different teaching modalities;
  - b. Identify groups of students with similar learning styles;
  - c. Designing an educational proposal that is increasingly built on the characteristics of the individual class.

Achieving these goals, the aim of future experiments, can mark an essential step towards thinking about teaching that effectively sees the student at the centre of their learning path.

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