Assessment processes and digital devices: Aspects of distance learning

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Abstract

The aim of the paper is to investigate the assessment practices implemented during the period of distance learning caused and "favoured" by the Covid-19 closure, which will start in March 2020. The empirical research is based on a quantitative approach, involving 1148 Italian teachers who responded to a battery of items, some of which focused on the assessment practices used in distance learning. The research shows a heterogeneous picture of assessment practices. The emergency context seems to be a generator of possible changes in teaching, provided that the assessment strategies, the design of learning tests and the feedback devices are strengthened by the awareness of the potential of digital environments and by the pedagogical intention to structure tests and coherent objectives.

L'articolo si propone di indagare le pratiche valutative attuate durante il periodo di didattica a distanza causato e "favorito" dal lockdown dovuto al Covid-19, a partire da marzo 2020. La ricerca empirica si basa su un approccio quantitativo, coinvolgendo 1148 insegnanti italiani che hanno risposto a una batteria di item, alcuni dei quali incentrati sulle pratiche di valutazione utilizzate nel periodo di didattica a distanza. La ricerca rivela un quadro eterogeneo delle pratiche di valutazione. Il contesto di emergenza sembra essere un generatore di possibili cambiamenti nella didattica, a condizione che le strategie di valutazione, la progettazione delle prove di apprendimento e i dispositivi di feedback siano rafforzati dalla consapevolezza delle potenzialità degli ambienti digitali e dall'intenzionalità didattica volta a strutturare prove e obiettivi coerenti.

Parole chiave: assessment processes; distance learning; digital technologies; ITIS scale; Italian teachers

Keywords: processi di valutazione; didattica a distanza; tecnologie digitali; scala ITIS; insegnanti italiani

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1. Introduction

During the period of distance learning caused and "promoted" by the lockdown imposed by the Covid-19 pandemic, i.e. from March 2020, the assessment practices of teachers in the digitally mediated school have undergone a transformation, as have the tasks proposed to students. The pandemic has imposed a profound change on educational institutions, which have had to adapt by trying to ensure the continuity of educational activities despite the emergency (Schleicher, 2020; Toquero, 2021). The Emergency Remote Education (Mobo, 2020) saw two different movements: on the one hand, teachers were convinced that they were experiencing a loss of learning on the part of the students; on the other hand, there were those who saw in the remote mode an important reflection, an opportunity to rethink not only the role and spaces of the digital, but also its potential, discovered during the pandemic, of a conscious and competent use of digital didactics, leading even to a rethinking of "school in presence" (Oliverio, 2020). There were some obvious critical issues, such as access to equipment for all students and access to the Internet (Lucisano, 2020), but the "forcing" of distance learning also led to a greater awareness of digital use by the educational world (Di Donato & De Santis, 2021b; Schleicher, 2020). This paper attempts to reflect on how the use of digital technologies during the pandemic led to changes in assessment strategies, how it made teachers feel more effective and led to a rethinking of assessment that could aspire to go beyond the emergency event to act in a transformative way even at its conclusion. In short, the question that has been asked is what legacy distance learning has left for school assessment after distance learning, and how it has achieved this. Even if the data presented are not very recent, the reflections arising from the paper concern those aspects of assessment that are still topical in the Italian educational debate (Benvenuto, 2017; Corsini, 2023; Grion et al., 2022). Reflecting on the functions and purposes of assessment, also in relation to the experience of distance learning, entails reflection both on the assessment processes and on the means and devices, in particular digital devices; therefore, this paper also tries to identify what has been possible to learn from the experience of distance learning due to the pandemic period.

2. Theoretical framework

Assessment processes are always a challenge to the professionalism of teachers at all levels of education. Gathering useful information to understand the progress and difficulties of the learners is at the same time indispensable to guide the direction of those who teach (Calvani et al., 2021; Visalberghi, 1955): assessment is an obligatory practice for the teacher, who is not always convinced to choose and prepare the most appropriate test to achieve the objective.

The topic is also very topical now, because the closure and the experience of distance learning have brought to the fore the distorting effects of the assessment process (Bond, 2020; Girelli, 2020) and the difficulty of constructing fair assessment devices (Benvenuto, 2017): this has led to criticism from students and some questioning of assessment practices by teachers themselves.

The reflection on what, how, when and why to assess (Benvenuto, 2003; Corsini, 2023; Greenstein, 2016) questions the forms of assessment that can be implemented in schools and the objectives to be achieved. In the 1960s, with Scriven (1967), the debate turned to formative assessment, understood as a process that supports the dynamics of teaching-learning, leading to continuous improvement in progress, with the learner at its centre. Summative assessment, on the other hand, still represents for the teacher the most important moment for evaluating student performance, although the term is perhaps beginning to be misleading with regard to the purposes of a final or even certifying assessment (Bhat & Bhat, 2019; Dixson & Worrell, 2016). Over time, formative assessment has been deconstructed in various ways: assessment *of* learning, assessment *for* learning, assessment *as* learning (Earl, 2003; Gurhy, 2017). The nuances of meaning have been directed towards assessment that is seen

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as an integral part of the learning process itself (Corsini, 2023). Still relevant today is the *balanced assessment* proposed by Stiggins (2002), understood as the continuous informative process that makes students aware of the results achieved. The element that characterises formative assessment is feedback (Butler & Nisan, 1968), which must be precise, frequent, varied, complete and effective, and therefore its informative power must include value judgements or recommendations for improvement, and also the student's contribution to understanding what else he/she can and must do to progress and improve (Di Donato, 2019). Feedback should be a recursive and dialogical process between the assessor and the assessee: Black and Wiliam had already demonstrated that not only does feedback make a difference to learning outcomes at all school levels, but that the success of good feedback depends on teachers' awareness and how they use it to shape teaching and learning (Black &Wiliam, 2010; Wiliam et al., 2004). The intervention of digital technologies in learning and assessment processes has offered the possibility of enhancing the student-centred dimension, linked to the formative function of assessment. In short, the question has been asked what legacy distance learning has left in the way of school assessment after distance learning, and how it has achieved it. for an effective link between digital teaching strategies and formative assessment to take place, it is necessary for teachers to master these competences, or be in the disposition to learn, in order to be able to support students' educational success.
In particular, during the periods of closure due to the pandemic, the immersive use of digital environments, the impossibility of constantly monitoring participation in learning tests and the nature of the tasks administered revealed the fragility of school assessment, which is entirely focused on the assignment of a numerical grade (Di Donato, 2023), and provoked numerous reflections in part of the educational community on the validity of the usual assessment procedures, which seemed less oriented towards formative and educational assessment (Grion et al., 2022) and more towards the exercise of power and control (Corsini, 2023).

3. Methodology, participants and tools

The aim of the present study is to investigate the assessment processes that have characterised teaching practices during distance learning, both to detect changes in assessment practices as perceived by teachers and to capture suggestions arising from the use of digital to implement these practices, even beyond the pandemic period. Overall, the study aimed to capture different aspects of distance teaching as experienced by teachers since the first lockdown in March 2020, but we also wanted to detect differences perceived by teachers between face-to-face and distance teaching. Among these perceived differences, we focus in this paper on what concerns the assessment experienced from the teachers' point of view, their assessment strategies and the feedback processes implemented in presence and at a distance; therefore, the specific research questions ask first of all what kind of approach the interviewed teachers have to the use of digital technologies in their work in general, whether there has been a continuity approach between presence and distance in the use of digital technologies, and what differences there are in the feedback to students between presence and distance; these questions also ask what functions the teachers attribute to assessment.
The empirical research presented here is exploratory in nature. The questionnaire on distance learning and the use of digital educational technologies (*Questionario sulla Didattica a distanza e l'uso delle tecnologie didattiche digitali*) (Di Donato & De Santis, 2021a, 2021b) was designed for data collection. 1148 teachers from almost all Italian regions (with the exception of Valle D'Aosta) took part in the survey, which was completed between April and October 2020 via Google Forms and disseminated through online channels: professional groups on Facebook, LinkedIn, WhatsApp, during online training events and through a specialised online magazine. These environments were dedicated to teachers, united by a desire for training and professional development (Di Donato & De Santis, 2021a).

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The convenience sample is characterised by the fact that 89.1% of the respondents are female. The majority of participants (44.1%) are between 46 and 55 years old. Table 1 shows the school grade in which the teachers participating in the research work.

Table 1. School level in which the participant teachers work

School grade	**%**
Primary school	40,3%
Secondary school	25,5%
Lower secondary school	24,7%
Nursery school	7,5%
Adult education	0,9%
University	0,7%
Comprehensive institute	0,4%
Total	100%

Overall, the questionnaire consists of 96 items, distributed as follows:

- 8 items capture background variables such as gender, age, teaching disciplines, school grade, city where teaching takes place;
- 2 items ask how often, before school closure, digital technologies were used to prepare and carry out teaching activities (with six response modes: 1 = never; 2 = a few times in a year (2-3); 3 = a few times in a month (2-3); 4 = a few times a week (1-2); 5 = almost always (3-4 times a week); 6 = every day);
- 3 items investigate the frequency of use of digital technologies during distance learning, distinguishing between asynchronous and synchronous activities (with six response modes: 1 = never; 2 = once every fortnight; 3 = once a week; 4 = a few times a week (1-2); 5 = almost always (3-4 times a week); 6 = every day);
- 29 multiple-choice items focusing on the type of device used in distance learning, the duration of the lesson "hour", the digital tools used before, during and after distance learning, and the type of training chosen and used by teachers;
- 27 items are used to investigate assessment activities in distance learning. Five of these items are open-ended questions, which allow teachers to describe the changes and advantages of distance learning, differences in assessment practices between face-to-face and distance learning and teachers' needs. 19 closed-ended items ask teachers to indicate what type of assessment they are using in distance learning and what they believe they will use in the future, also after distance learning. Teachers can answer by selecting multiple response options, using ways that refer to the past, present and future. For example, teachers are asked whether they have used oral exams/interviews and are asked to respond by indicating whether they have used them *in the past*, whether they are *using them in distance learning*, whether they plan to use them *in the future*, and whether they have *never used* them; they can select multiple answers. Finally, three multiple-choice items respectively ask: what function teachers attribute to assessment in distance learning, what kind of feedback they give in distance learning and what kind of feedback they give in face-to-face learning;
- 21 items, on a 5-point Likert scale of agreement (from 1 = strongly disagree to 5 = strongly agree) constitute the Intrapersonal Technology Integration Scale (ITIS) (Niederhauser & Perkmen, 2008) in the

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Italian version (Benigno et al., 2014), adapted to the context. The ITIS explores teachers' perceptions regarding the integration of digital technologies in their work.

Finally, an open-ended question asks teachers if they have received any indication from their school or university to undertake distance learning, specifying the type of indication. Another open-ended question asks teachers to specify how much attention they have devoted to implementing inclusive teaching and, finally, what are the main concerns and/or difficulties in distance learning (Di Donato & De Santis, 2021 a, b).

In order to answer the specific research question on assessment strategies (in particular, which tools and methodologies are used among written assignments, mixed tests, self-assessment, problem-solving, authentic tasks, oral exams/interviews, etc.) that asks whether there has been a continuity approach between presence and distance, we pause to analyse the answers given by teachers to the 19 closed-ended items that ask what kind of assessment they are using in distance teaching and what they believe they will use in the future; given that there are more than one answer alternatives that they can choose and given that they ask them to indicate a time perspective of use, nine answer categories were created that represent both combinations of answers and single answers; the nine categories are: 1) I have used in the past, 2) I am using in distance learning, 3) I think I will use also in the future, 4) never used, 5) continuity between past, present and future, 6) methodologies and tools used in the past and in the present, without looking to the future, 7) methodologies and tools used in the present and thought to use also in the future, 8) tools and methodologies never used but intended to be used in the future, 9) tools and methodologies used in the past and will be used again in the future.

On the other hand, in order to answer the question of the type of approach that the teachers interviewed had to the use of digital technologies in their work, the ITIS scale provides information derived from the respondents' own perceptions. Finally, the answers to the questions about the functions attributed to assessment and the type of feedback given to students, both face-to-face and at a distance, will allow us to highlight the changes perceived by teachers in the transition to digital teaching.

4. Data analysis and results

The analysis of the data on the ITIS scale was started (Benigno et al., 2014). Some items were reformulated to fit the specific research context. Skewness and kurtosis values were checked to highlight the normality of the data distribution. An exploratory factor analysis (EFA) was then conducted to identify relationships between observed and latent variables. The value of the determinant was above the empirical rule of 0.0001, which indicates the absence of multicollinearity (Barbaranelli, 2007). The Kaiser-Meyer-Olkin measure of sampling adequacy was 0.93, above the minimum value of 0.70 considered sufficient (Field, 2018). Bartlett's sphericity test is significant ($\chi 2$ (210) = 14121.473, $p < 0.001$). Factor analysis was performed using the principal axis factorial extraction method and the direct oblimin rotation method. The resulting four-factor model explained 60.32% of the total variance. The first factor Outcome Expectation explains 39.06% of the variance; the second factor Self-Efficacy explains 9.98%; the third factor Colleagues explains 6.92%; finally, the fourth factor Interest explains 4.36% of the variance.

The Cronbach's alpha coefficient values of the four factors confirm the reliability of the relative scales ($\alpha = 0.909$ Outcome Expectation; $\alpha = 0.883$ Self-Efficacy; $\alpha = 0.868$ Colleagues; $\alpha = 0.841$ Interest). The Outcome Expectations factor (M = 3.80; SD = 0.69) measures teachers' perceptions of their expectations of outcomes related to the use of digital technologies to support students' learning, including professional and personal outcomes; the Self-Efficacy factor (M = 3.66; SD = 0.66) measures teachers' perceptions of their self-efficacy and confidence in their own competence in using digital technologies; the Colleagues factor (M= 2.90; SD= 0.79) measures the perceptions that colleagues have regarding the use of digital technologies; the Interest factor (M=

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4.05; SD= 0.58) measures interest in the use of digital technologies in teaching and in the possibility of further training in this area (Di Donato & De Santis, 2021b; Niederhauser & Perkmen, 2008).

The Colleagues factor (item example: "My colleagues perceive me as more competent the more effectively I am able to use educational technologies in the classroom") emerged from the EFA, but is not found as explicitly in previous research models that used the ITIS scale in the pre-pandemic period, except as a sub-dimension. Therefore, a Confirmatory Factor Analysis (Brown, 2015) was conducted using Jamovi statistical analysis software (Gallucci, 2019) to test the factor structure, assuming that in distance learning, peer support was key in the use of digital devices and applications. Confirmatory factor analysis showed acceptable fit indices (Iacobucci, 2010), confirming the four-factor structure ($\chi 2$ =1424(df. 183), p=0.001); SRMR=.06; RMSEA=.07 (90% CI); CFI=.91; TLI=.90).

In order to understand whether the continuity in the use of digital tools and methodologies (compare above: category 5 emerged from the answers to the item, which asked which types of assessment tools they were using in distance learning and which they would continue to use in the future) had an influence on the internal factors influencing teachers in their teaching practices with respect to digital integration (ITIS), two of the methodologies with a higher percentage of choices were selected: mixed written tests with open and closed questions and oral exams/interviews. The one-way Anova and the post-hoc LSD (least significant difference) test showed a statistically significant difference between the continuous use (continuity between past, present and future) of mixed written tests and the four factors of the ITIS: Outcome Expectation (F(8, 1139)=8.3, p= 0.00), Self-Efficacy (F(8, 1139)=11, p= 0.00), Colleagues (F(8, 1139)=1.9, p= 0.05) and Interest (F(8, 1139)=5.8, p= 0.00); indicating that those who have consistently used mixed tests have higher expectations regarding their ability to integrate the use of digital technology in their teaching, compared to those who have never used these tests, compared to those who only used them before distance learning and compared to those who have only used them in distance learning. For the Self-Efficacy factor, the differences that emerged indicated that those who had continuously used mixed tests perceived greater self-efficacy than those who had not; this was also the case for the interest factor. On the other hand, with regard to the factor colleagues, those who had never used mixed tests felt less competent to integrate digital tests into their work than colleagues who had used mixed written tests in distance learning and intended to use them after distance learning; they also felt less interested in integrating mixed written tests into their teaching. For oral exams/interviews, however, a statistically significant relationship was found with three of the four factors: Outcome Expectation (F(8, 1139)=2.4, p= 0.02), Self-Efficacy (F(8, 1139)=3.8, p= 0.00) and Interest (F(8, 1139)=2.7, p= 0.01), again with reference to the continuous use (before, during and after the distance learning) of this practice compared to those who do not use it continuously.

The type of feedback given by teachers to students, both before and during the distance learning, was also taken into account. Figure 1 shows the differences between the two periods.

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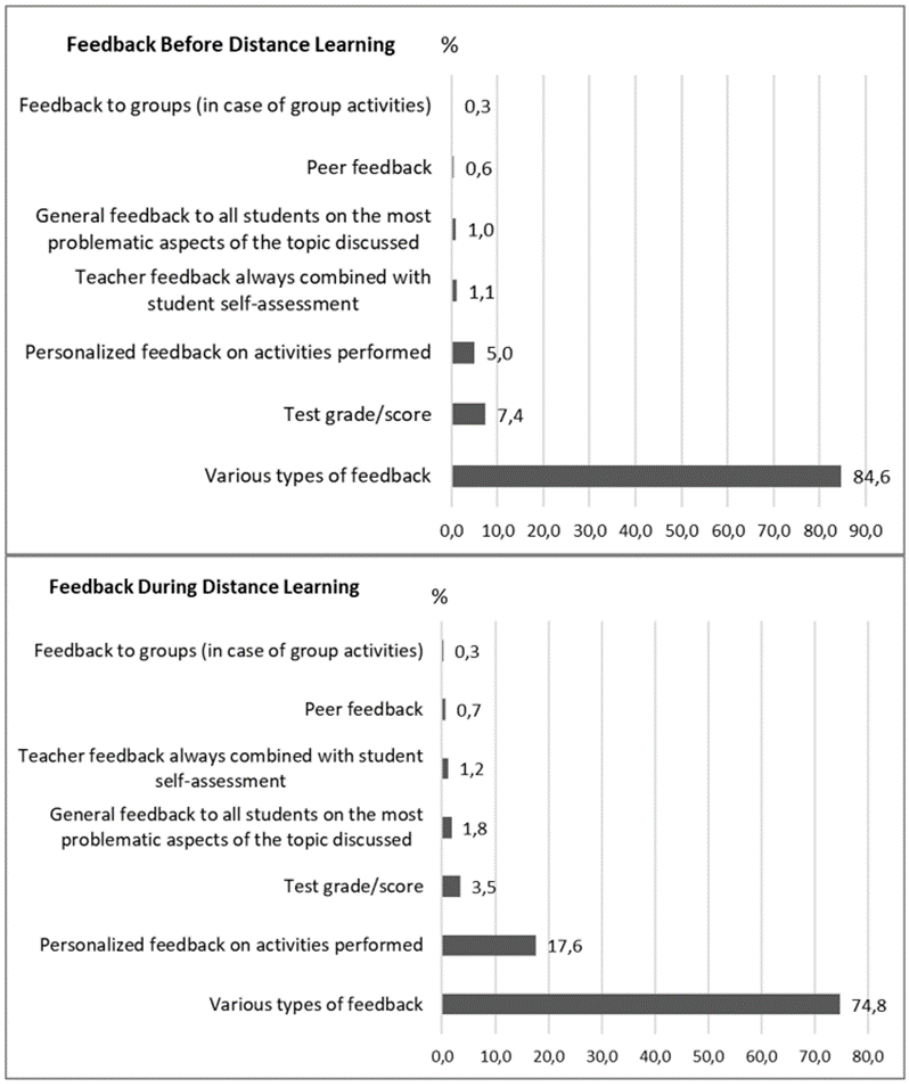

Figure 1. Different types of feedback given by teachers to students, before and during distance learning

As shown in Figure 1, most of the teachers participating in the research gave different types of feedback to students both before and during distance learning (before distance learning 84.6%; during distance learning 74.8%). During distance learning, more personalised feedback was given on the activities carried out (17.6%) than before distance learning (5.0%). The grade or score given on the assignment was used more often before distance learning (7.4%), whereas during distance learning it was a type of feedback used less often by teachers (3.5%).
It was hypothesised that depending on the type of feedback given to students, there might be a significant relationship with the ITIS factors; therefore, the hypothesis was tested using Anova. The one-way Anova found no statistically significant differences between the four ITIS factors and the type of feedback given by teachers in the face-to-face mode before the distance mode; however, with respect to the type of feedback given in the distance mode, there were statistically significant differences with three of the four ITIS factors: Outcome Expectation ($F(6, 1141)= 4.0$, $p= 0.00$), Self-Efficacy ($F(6, 1141)= 7.7$, $p= 0.00$) and Interest ($F(6, 1141)= 3.5$, $p= 0.00$). Figure 2 shows the differences that emerged.

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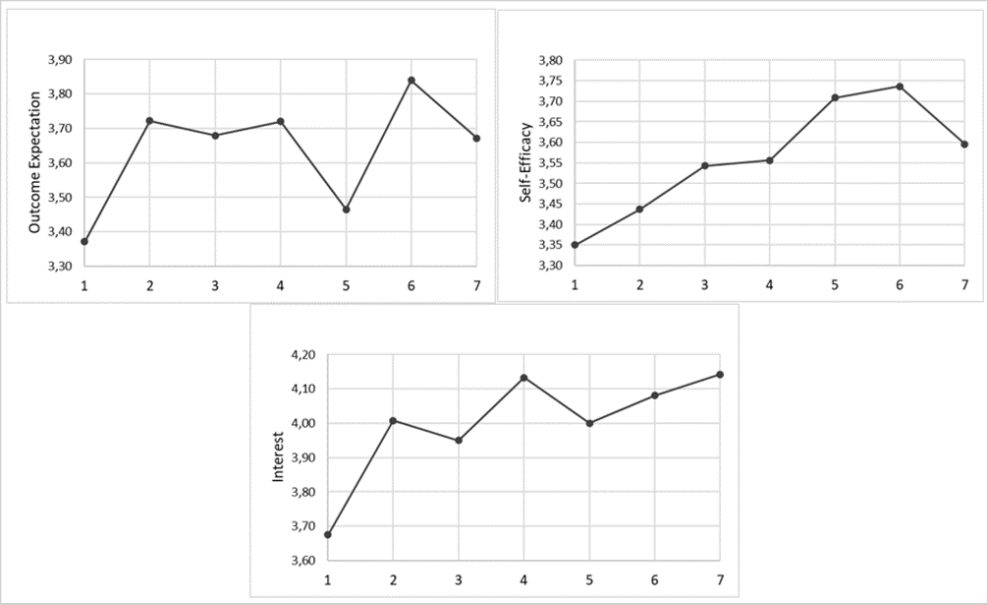

Figure 2. Graph of averages produced by Anova for types of feedback given by teachers in distance learning and three of the factors of the ITIS scale.
Note. Horizontal axis: 1 Test grade/score; 2 Personalized feedback on activities performed; 3 Feedback to groups (in case of group activities); 4 General feedback to all students on the most problematic aspects of the topic discussed; 5 Peer feedback; 6 Various types of feedback; 7 Teacher feedback always combined with student self-assessment.

In particular, it shows that those who have used different types of feedback in distance learning have higher expectations of the outcomes related to the use of digital technologies to support student learning and in terms of professional and personal outcomes; as well as perceiving a greater sense of self-efficacy and interest in using digital technologies.
Teachers were also asked to indicate the main function they assigned to assessment in distance learning. They could respond by selecting a maximum of two answers between 1= Summative, aimed at verifying acquired learning; 2= Formative for learning, aimed at supporting students in their learning and giving them feedback; 3= Diagnostic, aimed at verifying the level of incoming students; 4= Formative as learning, aimed at developing in students a process of self-regulation and monitoring of their own learning. In addition, there was the response "Other" to be specified. This category included the responses of pre-school teachers who wrote that they did not carry out an actual assessment, as is the case in the later school years.
As can be seen in Figure 3, the majority of the responses (39.2%) focused on the functions of formative for learning and formative as learning, selecting them together; 17.3% indicated only the formative for learning function; 14.1% selected the functions of summative and formative for learning; 10.9% indicated only the formative as learning function, 7.5% selected summative and formative as learning; the remaining choices were less than 4%, indicating the diagnostic and summative functions, also linked to other functions.

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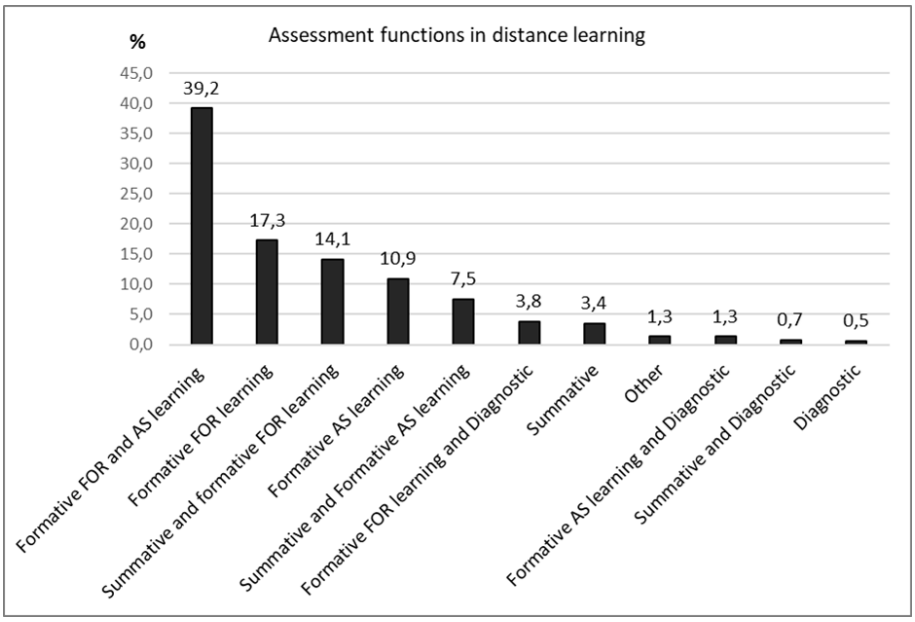

Figure 3. Graph of the assessment functions in distance learning by teachers

Again, the one-way Anova found statistically significant differences between three of the four ITIS factors (Outome Expectation, Self-Efficacy and Interest) and the function that teachers attributed to assessment in distance learning, as shown in Figure 4.

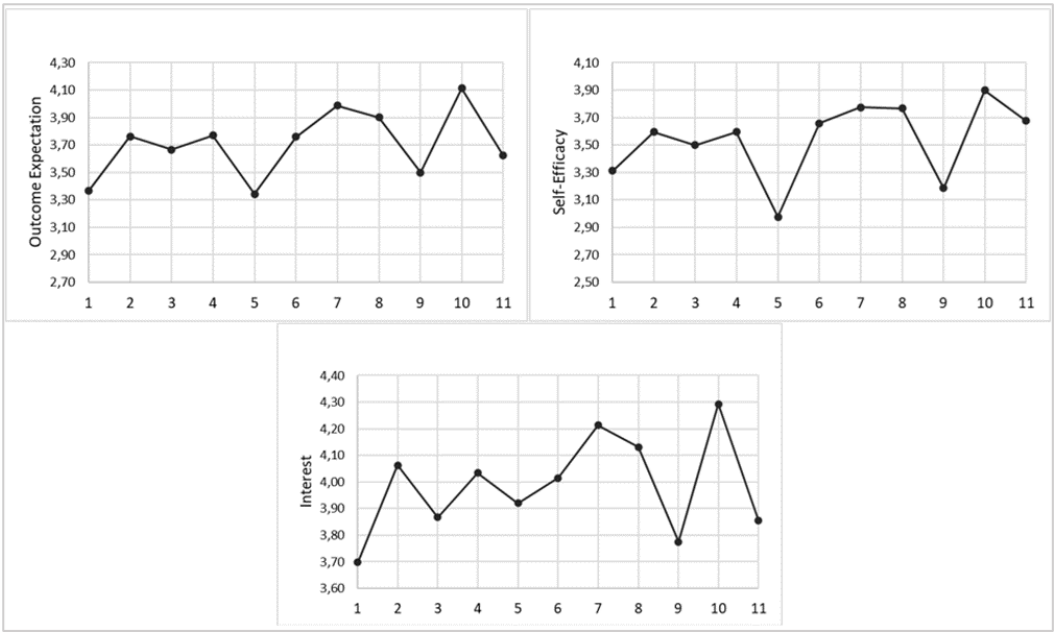

Figure 4. Graph of the averages produced by Anova for the assessment functions attributed by teachers in distance learning and three of the factors of the ITIS scale.

Note. Horizontal axis: 1 Summative, aimed at verifying the learning acquired; 2 Formative for learning, aimed at supporting students in their path and providing them with feedback; 3 Diagnostics, aimed at verifying the level of incoming students; 4 Formative as learning, developing a process of self-regulation and monitoring of one's learning; 5 Other; 6 Summative and Formative for learning; 7 Formative for learning and Diagnostics; 8=

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Formative for learning and Formative as learning; 9 Summative and Diagnostic; 10 Diagnostics and Formative as learning; 11 Summative and Formative as learning.

Figure 4 shows that those who ascribe a purely summative function to assessment have lower scores on the three factors of Outcome Expectation, Self-Efficacy and Interest than those who ascribe a formative function to learning and formative as learning, even among other functions.

5. Discussion and conclusion

This study focused on the digital assessment practices adopted by Italian teachers during the distance learning period. A limitation of the study is the type of sampling, as it is a convenience sample. In addition, the questionnaire was distributed through professional social networks (e.g. Facebook professional groups), which could have led to a bias towards teachers who are already interested in using digital technologies in their teaching. However, the analysis of the data showed that there are aspects of assessment that need to be considered beyond the pandemic period. For example, differentiating types of feedback based on digital support during distance learning led teachers to perceive themselves as more competent in supporting student learning through digital technologies.

The research and data presented so far show a heterogeneous picture of assessment practices in distance learning, but also offer a critical reading of the use of digital technologies in schools before and during the pandemic (Di Donato & De Santis, 2021b). In the results presented, the emerging context seems to be able to be a generator of possible changes in didactics, provided that assessment strategies, the design of learning tests and feedback devices are strengthened by an awareness of the potential of digital environments, a renewed trust between teacher and student and the manifestation of an educational intentionality aimed at structuring mutually consistent tests and objectives, imagining a variety of tools to ascertain understanding and motivate participation.

Teachers who had more continuity in their use of digital educational technologies before the pandemic, and who therefore continued to use them with increasing competence during distance learning, were more likely to use them in assessment processes. This involved not only a change in assessment techniques, but also in the types of tests administered, including closed-ended written tests, open-ended written tests and authentic tasks with outcomes that were not predetermined but variable and personal. The digital devices used in distance learning seem to have first modified didactics and assessment practices, then introduced variability in the design of learning tests, representing an active factor in the possible development of innovative didactics and in the design of clear and shared learning outcomes (Trinchero, 2022).

The present study, through the interpretation of data and results, has been able to reflect on aspects of assessment that have become a central theme in the current Italian debate (Corsini, 2023; Grion et al., 2022). Differentiating the feedback given to and between students not only has an important function in improving learning (Grion et al., 2021), it allows to extend the comparative process that students activate from the different information coming from the context; this process links the task that students perform to different types of feedback from the environment (from the teacher, from network sources, from peers, etc.); to make this process virtuous, the teacher is called to play an active role in differentiating not only the feedback but also the teaching strategies in order to stimulate responsible student participation (Grion et al., 2021), at the same time becoming more aware of the use of digital technologies also in assessment processes.

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