



Research paper

Shaping the assessors of tomorrow: How practicum experiences develop assessment literacy in secondary education pre-service teachers

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ABSTRACT

This study analyzes the impact of the supervised practicum on the assessment conceptions and practices of pre-service secondary education teachers, using the theoretical rationale of assessment literacy. We conducted a qualitative study with eighteen pre-service physical education teachers in Spain. The results revealed the difficulties and the variety of experiences the participants encountered during the practicum in relation to assessment. Student accountability and improving learning and teaching were the most common assessment conceptions, although the assessment tasks designed by the participants were not entirely formative. In general, the practicum experience reaffirmed their previous ideas on formative assessment.

1. Introduction

Assessment is one of the main strategies teachers use to facilitate learning, to certify student achievement, and to develop students' capacity to evaluate their future learning (Boud & Falchikov, 2006; Panadero et al., 2019). Although assessment should be a core teaching skill, some studies show that assessment practices in classrooms usually do not enhance its full formative potential (Berry, 1990; Panadero et al., 2019; Wylie & Lyon, 2015). Research on the variables that explain this lack of formative purposes of assessment in education reveals that initial teacher education (hereinafter, ITE) is crucial (Yan et al., 2021). Therefore, it is relevant to understand the influence of ITE on assessment. In our study, we focus on how an essential stage of the ITE, the teaching practicum, influences the conceptions and practices of pre-service secondary education teachers. In this introduction, we will explain the importance of understanding the effects of this stage.

To begin, novice and pre-service teachers show limitations in their knowledge about assessment and their self-efficacy to implement effective assessment practices (Fernández-Ruiz, 2022; Maclellan, 2004; Volante & Fazio, 2007). Therefore, some experts argue that many teachers are not prepared to integrate assessment effectively into their

teaching (Pastore & Andrade, 2019). For these reasons, researchers have developed theoretical frameworks of teacher assessment competences (Herppich et al., 2018) and teacher assessment literacy (DeLuca, 2012; Pastore & Andrade, 2019; Popham, 2009; Xu & Brown, 2016), that defend the importance of promoting assessment training and capabilities throughout the different stages of teacher education.

Many of these models for teachers' professional development on assessment share important features (Fernández-Ruiz, 2022). On the one hand, they emphasize the importance of strong theoretical knowledge on key assessment aspects. On the other hand, they consider other factors, both contextual (e.g., policies, resources, agents involved) and individual (e.g., conceptions, teaching experience) that affect how teachers implement assessment in their practice. Therefore, assessment literacy can be defined as the theoretical knowledge and skills that teachers use in their assessment practice, which is influenced by contextual and individual factors (DinanThompson & Penney, 2015; Fernández-Ruiz, 2022).

Initial teacher education is essential for developing assessment literacy (DeLuca et al., 2016; Yan et al., 2021) which, at the same time, influence assessment conceptions (Brown & Remesal, 2012; Kyttälä et al., 2024), with both influencing what teachers do in their classrooms.

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Pre-service teachers should obtain and develop advanced knowledge about assessment (i.e., assessment literacy) to be able to implement it properly when they become practicing teachers (Atienza et al., 2018) and to reflect about their own assessment conceptions in light of that new knowledge (Fernández-Ruiz, 2022). Therefore, it is necessary to identify the impact of ITE, specifically the practicum, on assessment conceptions and practices.

1.1. Teacher education and the importance of the practicum in assessment literacy

There is a broad consensus that a supervised practicum is an essential part of ITE and is one of the most highly valued contents by students (Ulvik & Smith, 2011). However, extensive literature reviews, such as those conducted by Cohen et al. (2013) and Lawson et al. (2015), indicate that there is no "typical," "common," or "standard" practicum. In each country, the practicum can be organized differently, and the time spent in schools by pre-service teachers is heterogeneous. For instance, the European Commission (2012) reported that while pre-service teachers in lower secondary education in UK spent 778 h in school placement and 540 in Lithuania, this number decreased to 34 in Luxembourg and 40 in Latvia. According to the OECD (2018), a teacher practicum is not required in all the countries that participated in PISA, but a mandatory practicum was a common feature of the high-performing countries (except Macao-China).

Among the main outcomes of this critical training period are the improvement of teaching effectiveness and self-confidence, as well as changing perceptions and beliefs in pre-service teachers (Lawson et al., 2015). The practicum is a decisive period in pre-service teachers' professional development because they have access to a professional teaching culture, via a set of experiences and knowledge inherent to the profession, including assessment practices and conceptions (Brito, 2020). To this end, practicums need to be an important part of the curricula (Gil-Molina et al., 2018).

Importantly, there are three key concepts to consider regarding assessment in our study. Assessment literacy involves the knowledge and skills required to critically engage, understand, apply and interpret assessment effectively (DinanThompson & Penney, 2015). Assessment conceptions refer to the beliefs and understandings that teachers hold about the purposes and uses of assessment (Brown, 2008; De Luca et al., 2019a,b). Assessment practices are the actual methods and strategies teachers use to evaluate and support student learning (Panadero et al., 2019). The relationship between these constructs is cyclical and mutually reinforcing: as pre-service teachers enhance their assessment literacy through practical experience, their conceptions of assessment evolve to appreciate its formative potential (Fernández-Ruiz & Panadero, 2020). This evolved understanding then guides them to adopt more effective assessment practices, which further refines their assessment literacy in an ongoing process of professional growth (Fernández-Ruiz, 2022). Crucially, in this paper we use the term assessment literacy as an overarching concept to frame the whole study. Nevertheless, we empirically explore conceptions and practices, which can be understood as a part of teacher's assessment literacy.

The practicum is crucial for solidifying student teachers' assessment literacy (Xu & He, 2019). During this period, student teachers not only observe but also practice various assessment methods under the guidance of experienced tutors. This hands-on experience is vital for translating theoretical knowledge into practical skills (Allen & Wright, 2014). As pre-service teachers develop their assessment literacy, they can gain a deeper understanding of the assessment role in enhancing student learning and informing instruction (Xu & He, 2019). This newfound literacy, in turn, can shape their assessment conceptions, helping them to see assessment not merely as a tool for grading but as an integral part of the learning process (Fernández-Ruiz, 2022). Consequently, this can influence the types of assessment practices they implement, moving towards more formative and student-centered approaches.

1.2. Conceptions of assessment

In this study, we investigated pre-service teachers' conceptions of assessment during their practicums employing Brown's (2008) framework based on four major conceptions: (a) Improvement: assessment improves teaching and learning; (b) Student accountability: assessment makes students accountable for learning, partly through the issue of certificates and credentials; (c) School accountability: assessment demonstrates the quality and accountability of schools and teachers; and (d) Irrelevance: assessment should be rejected because it is invalid, irrelevant, and negatively affects teachers, students, curriculum, and teaching.

The conceptions of assessment of pre-service teachers are influenced by the transmission and acquisition of an assessment background (Chan et al., 2011). During their training, pre-service teachers are instructed in the current legislation developed by policy makers, and they have to conceive their own interpretation and develop it in specific tasks (e.g., when designing an assessment for a teaching unit). In addition, during the practicum, they have to combine their dual teacher-student role carrying out assessments at the same time as they experience assessment as students. Thus, in order to provide high-quality teacher education, it is essential to connect theory and practice through both the design of higher education courses and the integration of the practicum in settings that support good practice (Darling-Hammond, 2017).

Among the limited number of research papers that have specifically studied the impact of the practicum on conceptions of assessment, Xu and He (2019) and Prastikawati et al. (2022) reported an important change in pre-service teachers due to the practicum. This change is influenced by personal, experiential, and contextual factors such as: (a) a more comprehensive understanding of assessment purposes; (b) a broader understanding of how assessment is not merely about testing but rather about improving teaching quality to support the pupils' learning process; and (c) an emerging awareness of how to evolve from summative to formative assessment.

Finally, it should be noted that context also plays a decisive role in shaping pre-service teachers' conceptions and practices of assessment. Studies such as those by Brown and Remesal (2012) in Spain and New Zealand, and Chen and Brown (2013) in China, show that there may be disparities due to different cultural norms, assessment policy priorities, and assessment courses offered during teacher education. In this regard, more studies are needed to better understand the role of the practicum in the assessment conceptions and practices of pre-service teachers in different contexts.

1.3. Assessment practices: strategies and tools

Teachers' assessment techniques and practices are influenced by their assessment literacy (DeLuca, Chapman-Chin, & Klinger, 2019; DinanThompson & Penney, 2015) and their conceptions about assessment (Brown & Remesal, 2012). Within Brown's framework of conceptions, the one most closely related to a conception of formative assessment is "improvement" (assessment improves teaching and learning). According to Torrance (2012), the assessment practices from a formative perspective should clarify both 'task criteria' (what needs to be done to accomplish the task), and 'quality criteria' (what constitutes doing the task well), considering that some criteria can outweigh others. This constitutes the 'what' (i.e., what criteria to invoke and employ in a particular setting). Concerning the 'how' assessment is implemented, the strategies and tools used are the demonstration of the assessment approach adopted (López-Pastor et al., 2013).

Among the most important strategies for a truly formative assessment are: (i) clarifying and sharing learning intentions with the students; (ii) designing effective tasks and activities that elicit evidence of learning; (iii) providing feedback that moves the students forward; (iv) activating students as learning resources for one another; and (v) mobilizing students as responsible for their own learning (Tolgfors,

2018; Wiliam, 2011). This results in the development of assessment tools (e.g., rubrics, observational sheets, written assignments, portfolios), which can be more summative or formative depending on how they are designed based on the strategies described above.

In our study, we analyzed the assessment practices of pre-service secondary education teachers. Considering their lack of professional experience, we considered the design of an assessment task during their practicum as an example of how their assessment practice could be when they started to work.

1.4. Research context: the practicum in teacher education for secondary education in Spain

In the Spanish context, secondary education teachers follow a formative path where their pedagogical training only takes place after obtaining their bachelor's degree. Therefore, to teach in secondary education, teachers must hold a bachelor's degree, which lasts four years and represents a total of 240 ECTS (European Credit Transfer and Accumulation System; 1 credit corresponding to 25–30 h of workload). During these years they specialize in a discipline or profession (e.g., Math, History, Law, Engineering) without pedagogical training courses being involved. After that, they must obtain the master's degree in teaching in secondary education, where they get pedagogical training in courses of their specialty and other general courses such as developmental psychology and sociology of education (Hernández & Pardo, 2022). The master's degree is normally completed in a single year, with a total of 60 ECTS. This is a compulsory certificate that all secondary school teachers must have, regardless of whether they are going to work in private or charter schools or apply for a public position.

The practicum accounts for between 10 and 12 ECTS of the total curriculum of the master's degree. This implies around 200 non-remunerated teaching hours with a school-based teacher mentor, which represents an important weight regardless of the specialization (e.g., Math, History, Physical Education). As for the competences to be acquired during this period, the national legislation itself specifically establishes the need to "acquire experience in planning, teaching and assessing the subjects corresponding to the specialization" (Order ECI/3858/2007).

1.5. Aim and research questions

The aim of this study was to analyze the impact of a supervised practicum on the assessment conceptions and practices of pre-service physical education (PE) teachers. With this, we intend to improve our knowledge about the effect of teacher education on assessment literacy and how future secondary education teachers consider assessment as a tool for learning. For this purpose, our specific questions were:

- RQ1. What is the impact of the practicum in assessment conceptions of pre-service teachers?
- RQ2. What is the experience¹ of pre-service teachers with assessment during practicum?
- RQ3. What assessment tools and strategies do pre-service teachers design at the end of the practicum?

RQ1 focused on the discourse that pre-service teachers had about their conceptions regarding assessment. RQ2 focused on the kind of participation on assessment pre-service teachers had during their practicum and how their tutors' assessment practices could affect them. RQ3 focused on the actual assessment tools and strategies that pre-service teachers designed and would like to implement as teachers. Therefore, RQ1 dealt with participants assessment conceptions, while RQ2 and

RQ3 dealt with assessment practices, in the case of RQ2 considering the practices used by the tutors' and how pre-service teachers participated and were influenced by them, and in RQ3 analyzing how pre-service teachers design a specific assessment task.

We chose PE for our study due to its great pedagogical importance in Spain in the last decade in relation to assessment studies, especially focused on formative assessment (López-Pastor et al., 2020). In addition, there was a lack of studies focusing specifically on the impact of the practicum on the assessment conceptions of pre-service PE teachers; as the most recent studies, such as those carried out by Xu and He (2019), and Prastikawati et al. (2022), have specifically targeted English as a Foreign Language (EFL) pre-service teachers.

2. Method

2.1. Participants

The participants were selected using purposeful sampling (Coolican, 2014), receiving an email with the information of the research and a consent form. Of the 20 pre-service teachers who were invited, 18 agreed to participate in the study (Table 1). All of them were studying the master's degree in Teacher Education for Secondary School, in the specialty of PE, during the academic year 2020–2021 in a public university where the first author works. They were enrolled in Practicum (12 ECTS), the last course that they take before defending their master's thesis. In this regard, students had already taken courses such as Teaching in PE and Curriculum Design in PE (both 6 ECTS), which specifically address theoretical and practical aspects of assessment. They did not get any reward from their participation in the study, although the assessment task was assessed and graded before the post-practicum interview and it had a weight of 10% in the participants' practicum final grade (all students had this assessment activity, whether or not they agreed to participate in the study).

2.2. Research design and data collection techniques

This was a qualitative study based on semi-structured interviewing and task analysis (Brinkmann & Kvale, 2018; Creswell & Creswell, 2017). Although we made a general analysis of the information collected through all the techniques, each source contributed differently to answering the 3 Research Questions. In Table 2 we present the specific contributions.

Table 1 Demographic information of the participants in the study.

	Male	Female	Age
Participant 1		X	23
Participant 2	X		23
Participant 3		X	25
Participant 4		X	24
Participant 5		X	24
Participant 6	X		23
Participant 7		X	23
Participant 8	X		23
Participant 9	X		25
Participant 10		X	24
Participant 11		X	24
Participant 12	X		23
Participant 13		X	23
Participant 14	X		23
Participant 15	X		25
Participant 16		X	24
Participant 17	X		23
Participant 18	X		23
	9	9	23,61

¹ We use the term experience to refer to the kind of assessment activities in which participants have been involved, not in terms of their personal meanings.

Table 2

Data collection techniques used in relation to the Research Questions.

	Semi-structured interview pre-practicum	Semi-structured interview post-practicum	Task analysis
RQ1	X	X	
RQ2	X	X	
RQ3		X	X

2.3. Semi-structured interviews

Semi-structured interview administered before the practicum period: this interview had seven sections: 1) introduction to the interview and briefing; 2) training in assessment during the undergraduate and post-graduate studies; 3) conceptions about the purposes and determinants of assessment; 4) disciplinary determinants of assessment; 5) expectations of the practicum period and motivations for the teaching profession; 6) agreement with assertions on assessment (Brown, 2008); and 7) final reflections. The whole structure of the interview can be consulted in Annex 1.

Semi-structured interview administered after the practicum period: this interview had five sections: 1) introduction to the interview and briefing; 2) experience with assessment during the practicum; 3) explanation of assessment task designed; 4) impact of university training on assessment conceptions and practices; and 5) final reflections. The whole structure of the interview can be consulted in Annex 2.

2.4. Task analysis

Participants carried out a written individual assignment in which they had to design the assessment of a teaching unit associated with contents taught during their practicum (Annex 3). They had to explain the following aspects about the assessment of the teaching unit: 1) course and group where the assessment would be implemented; 2) content of the unit; 3) assessment perspective; 4) assessment criteria and learning standards; 5) assessment tools; 6) assessment activities; 7) sequencing; and 8) references. During their practicum, they had the option, when possible, to implement the assessment they had designed. The impossibility of carrying out the assessment did not imply, in any case, a lower grade. The tasks were analyzed for this study only after they had been assessed for the practicum grades.

2.5. Procedure

The study was approved by the Ethics Committee from the first author's university, where all the participants studied. After this approval, the first author emailed the 20 students enrolled in the master's specialty explaining the project. He scheduled the initial interviews with the 18 students that agreed to participate and signed the informed consent. The second author, who was not a teacher at that university, carried out the interviews to reduce social desirability. The individual interviews took place in December 2020 and January 2021 and lasted between 30 and 35 min. Due to the COVID-19 pandemic situation, all the interviews were performed online, in a secured conference site in the university virtual Campus (Blackboard), and they were recorded. All the interviews followed the same general structure, but the interviewer formulated some additional questions depending on the participants' responses. At the end of January, the participants started their practicum in schools, and by the end of March, they had to submit their assessment tasks. The second and final interviews took place at the end of May, after the participants' practicum period of 200 h, following the same procedure as the initial interviews. These final interviews lasted around 20–25 min. Interviews and task analysis were conducted once the students obtained their master's degree.

2.6. Coding categories and data analysis

Fig. 1 shows a summary of the steps for data analysis that will be detailed later.

The approach to data analysis was qualitative, following a process of collaborative analysis (Cornish et al., 2014), and we did not use a specific interpretative framework (Creswell & Poth, 2017). One of the advantages of collaborative data analysis is that it can provide different perspectives (Cornish et al., 2014). The two authors responsible for data analysis (1st and 2nd) came from two different disciplines (Sport Sciences and Educational Psychology) and had different levels of research expertise (senior and emergent researcher). The 3rd author, an established researcher in Educational Psychology, worked as an auditor at different stages, in order to improve the accountability of the data analysis (Akkerman et al., 2008) carried out by the 1st and the 2nd authors.

We used ATLAS.ti software to analyze the data. Mostly, we took a cross-case approach to data analysis (Miles et al., 2014), emphasizing strategies to compare participants' views and experiences. First, the pre-practicum interviews were transcribed literally by external staff. The 2nd author coded these interviews and drafted memos with a summary of each case, while the 1st author assessed and coded the assessment tasks and drafted memos with a summary of each task. Then, the three of us discussed together the ideas extracted from the initial analysis to write the script for the second interview, in which we devoted a section to discuss the assessment tasks designed by the participants. Once we had the records of the interviews made after the practicum period, they were transcribed by the same person and the 2nd author coded them and again drafted memos with summaries of each case.

During this stage of initial coding of all the material, we used both theoretical codes, based on previous research (e.g., self-assessment, sequencing, improvement conception), and in vivo codes, created according to the interviewees' responses (e.g., enjoying PE, mentors' subjectivity) (Bazeley, 2013). After the initial coding, we started a stage of focus coding, where the 1st and 2nd authors reviewed the codes. Using a common document, with all the codes with their quotations organized by the coder, we read and commented on each other's codes and quotations. This process allowed us to clean and review the list of codes, deleting non-relevant codes, merging codes with similar quotations but different names and, in some cases, dividing codes that included heterogeneous quotations.

Lastly, we started with more elaborated strategies of conceptual analysis, creating two matrices (Miles et al., 2014) with a comparison of all the cases in different topics, considering their perspectives in the two interviews and the assessment task. Using these matrices, the 1st and the 2nd authors discussed the data and extracted some preliminary conclusions that were audited by the 3rd author. In the final stage of data analysis, the three of us selected the main points of the analysis and decided on the structure with which to report the results. As many qualitative researchers argue, the writing process was essential to provide sense and clarity to the results (Bazeley, 2013; Creswell & Poth, 2017; Gibbs, 2018).

3. Results

To help the reader understand the results, in Table 3 we summarize the main results, and we present the data collection techniques that provided the evidence.

RQ1. What is the impact of the practicum in assessment conceptions of pre-service teachers?

To analyze these data, we employed Brown's taxonomy (2008) based on the four categories presented in the theoretical framework. Considering the interviews (pre- and post-practicum) and the task design, participants held ideas connected with three kinds of assessment

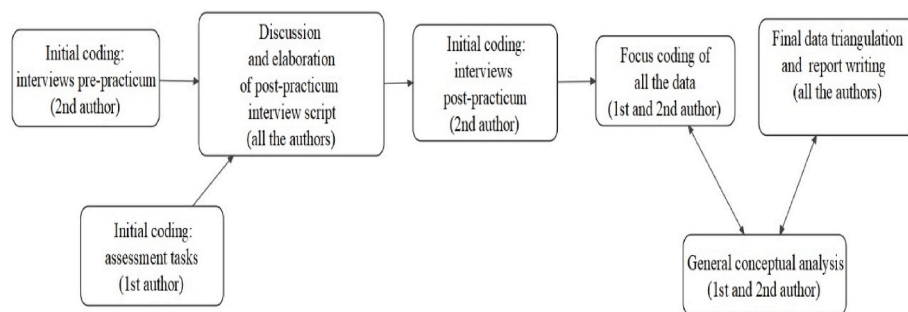


Fig. 1. Summary of data analysis process.

conceptions according to Brown's proposal (2008) –improvement, and school and student-accountability–. Importantly, none of the participants mentioned aspects related to the irrelevance category. Next, we analyze the results of the three categories that were identified in our participants' answers.

Firstly, the category of student accountability was the dominant category for two reasons. First, it was expressed by most participants (17). Only Leticia, participant number 4, did not express ideas connected with this view during the pre and post interviews. Second, this conception was expressed more spontaneously when we asked participants about the purposes of assessment during the post-practicum interview (16 participants), as we can see in this extract:

Interviewer: Well, then, what do you think is the purpose or purposes of assessment?

Participant: To establish if he [the student] reaches or doesn't reach what is proposed by the assessment criteria. In the end, in PE we usually assess procedures, because it is practical, unlike the other courses that are theoretical.

Participant 5, Irene, post-practicum interview.

Regarding the other two conceptions –i.e., improvement and school accountability–, these were not usually expressed spontaneously, but participants showed agreement with them when we presented assertions connected with them. That is why many participants seemed to hold conceptions related to the purposes of teaching (8 participants) and learning improvement (9), and school accountability (12) during the pre-practicum interview. However, these numbers were reduced to 3, 8 and 3, respectively, during the post-practicum interview, where we only included a general question on the purpose of assessment, and not assertions to agree or disagree about each of the four assessment conceptions.

In essence, participants emphasized the conception of student accountability. They considered that at the end of the unit or period you must give a grade in order to certify if a student has reached the expected outcomes. It is a way to close the process, and it is required by the educational system. In addition, more than half of the participants (12) highlighted that these learning objectives must be connected to learning standards in the area (conception of school accountability). At this point, it is important to note that the educational legislation enforced at the time (LOMCE, 2013) set standards and measurable learning outcomes, which were specifications of the assessment criteria that allow learning outcomes to be defined. They specified what pupils should know, understand and be able to do in each subject, including PE. They had to allow for the grading of performance or achievement. They had to be observable, measurable and assessable. Learning outcomes needed to contribute to and facilitate the design of standardized and comparable assessments. This could help to explain why participants usually emphasized school accountability and assessment according to standards of performance and their awareness that schools and teachers had to comply with the law:

You must prove that you are assessing, that you are doing exams with your students, because in the end it is, so to speak, what the law demands

Participant 16, Beatriz, pre-practicum interview

In spite of showing these ideas regarding student and school accountability, many participants were also very critical with the idea of implementing learning standards, and they defended the idea that assessment should be a tool to improve learning and teaching (conception of learning improvement). According to them, ideally, learning assessment should consider the learner's progress from the beginning of the course/unit to the end, and it should help the students to become aware of their learning, to improve, and to apply what they have learned to their daily lives: healthy habits, physical activity, and sports. These two extracts illustrate these ideas:

Each teacher can agree or disagree with whether these standards are realistic or not, useful or not. Then, you must do it; there are many standards and practically you must focus your assessment on that, but the truth is I don't think this is the best.

Participant 12, Ana, pre-practicum interview.

Assessment is very important because it's going to improve the whole educational process. It's going to improve the quality of the school and the evaluation of the teachers. It's going to make them improve [the teachers] and to assess themselves (...). The students could see the process they're following and participate in their self-assessment and their own learning.

Participant 1, Raquel, post-practicum interview.

RQ2. What is the experience of pre-service teachers with assessment during practicum?

All the participants held high expectations regarding the role of the practicum period in their learning process, specifically in learning how to assess. They believed that this would be a pivotal stage in their training as it would enable them to apply the knowledge they had accumulated. This hands-on experience would allow them to observe, trial, and either select or discard various assessment systems. One of the students expressed it in this way:

I think it is a great opportunity (...). You are going to gain knowledge beyond the theory they have explained to you (...). You get to know by applying it practically, with its pros and cons.

Participant 10, María, pre-practicum interview.

However, after the practicum the participants' perspectives on the quality of the experience during the practicum were not unanimous. The wide range of experiences with assessment and the challenges encountered resulted in considerable diversity among participants regarding

Table 3
Summary of the main results for each question and data sources.

	Main results	Data collection technique
RQ1: What is the impact of the practicum in assessment conceptions of pre-service teachers?	1. Student accountability was the dominant conception among participants	1. IB, IAF
	2. Teaching and learning improvement, and school accountability conceptions were accepted by many participants, but they were not expressed so spontaneously	2. IB, IAF
	3. Participants emphasized the importance of complying with the learning standards and the legislation, but they were critical with the use of standards	3. IB, IAF
RQ2: What is the experience of pre-service teachers with assessment during practicum?	4. Participants had high expectations regarding the role of practicum in their knowledge about assessment	4. IB
	5. Participants' experiences with assessment during the practicum was very heterogeneous; in some cases it was a very restricted experience	5. IAF
	6. Half of participants disagreed with their tutors' assessment practices, while the other half held a positive view. The main arguments considered were the role of performance exams vs other assessment tasks, the clarity and specificity of assessment criteria	6. IAF
	7. Participants reported difficulties implementing assessment and acknowledged a contrast between formative assessment theory and practice	7. IAF
	8. No participants improved their ideas towards a more formative view of assessment after the practicum experience and there were two that even diminished their discourse on formative assessment	8. IB, IAF, TA
	9. Rubrics and checklists were the tools preferred by the participants in their assessment design due to their facility of design and use	9. IAF, TA
	10. The assessment tools proposed were not entirely formative and the used of shared assessment was scarce	10. IAF, TA
	11. Many participants considered behavioral components, such as activity engagement, as an important part of the assessment	11. IAF, TA
RQ3: What assessment tools and strategies do pre-service teachers design at the end of the practicum?		

Note: IB: interview before the practicum; IAF: interview after the practicum; TA, task analysis.

how they perceived the value of the practicum experience in their knowledge about assessment.

Crucially, during the practicum the participants had different experiences with assessment under their tutor's lead. While seven participants participated in both the design and the implementation of the assessment system, nine participants only graded students –in a few cases with a rubric–, and two participants had an even more reduced experience –one did not contribute to assessment and the other provided feedback to students after they passed the performance exam with the

tutor–.

In addition, the assessment systems used by the tutors and how they were considered by the participants were diverse: half of participants were disappointed and disagreed with the assessment practices that their tutors in the schools were using. Among the main critiques the participants expressed regarding their tutors' assessment practices, was the consideration that they were based only on traditional exams of physical performance, leaving aside aspects such as the progression of each student and the use of other assessment activities (e.g., group and individual projects). Furthermore, they remarked that the criteria to grade the exams were not explicit, so the teacher's judgement was sometimes subjective, and the students did not know what they had to do to perform well. In a couple of cases, this led them to consider that they had learned very little in terms of assessment. In these excerpts we can see this negative view of the tutor's assessment practices:

I would like to do it better, especially if I had as much experience as him [his tutor]. It seemed to me that it was not regulated or established, it was improvised; today we have an assessment and I assess you, and I grade you as I see fit.

Participant 17, Pablo, post-practicum interview

To be honest, in terms of assessment it [the practicum] has not been very useful because I see more weak points than strengths. That is, I could take practically nothing from the tutor for my future job. I'll have to keep meditating on it.

Participant 12, Ana, post-practicum interview.

By contrast, the other half of the participants agreed with and held a positive view of their tutor's assessment practices. In this regard, they emphasized when their tutors were explicit about the performance criteria, when they took into account several sources of information to assess the students' learning (not only a final exam of physical performance), and when the assessment activities could help their students to develop healthy habits and positive attitudes towards sports and exercise (i.e., when the activities seemed to be meaningful). This participant expressed it clearly:

He [the tutor] has everything so clear, so structured, and for the pupil it is easy to know what to do and how to do it to get better grades (...). These are not things that you prepare for the exam and then forget about them ... these are activities that connect with the pupil's improvement in sports practice.

Participant 6, Teresa, post-practicum interview

During their assessment experiences in the practicum and with the development of the assessment design task, the participants reported that they faced difficulties in the implementation of assessment practices, especially regarding the implementation of formative practices. They considered their experience during the practicum had made them aware of how difficult it was to implement the assessment contents they had learned during their studies. According to them, there is a huge leap from formative assessment theory to practice; when you get to know the conditions in a real high school (i.e., many students and groups, and the lack of resources and time), you see that it is difficult to implement formative assessment practices.

Despite this, as we will present in the following sections, the participants used and designed assessment tools with formative purposes coherent with the theory they had learned, and their conceptions emphasized the important role of assessment in students' learning. In this respect, considering the general evolution of the participants during the process, according to the three sources of information used in this study, a relevant result was that no participant improved or changed their discourse, conceptions, and practices towards a more formative view of assessment after the practicum. All the participants that emphasized the formative role of assessment at the end of the training process had previously discussed or mentioned these ideas in the pre-

practicum interview. Nevertheless, it is significant that there were even two participants (4 and 18) whose ideas on formative assessment diminished after the practicum. The experience with assessment of these two participants during the practicum was reduced to grading, and according to their reports their tutors used an assessment system composed only of final exams and they did not have clear and objective criteria. The case of participant 4 is illustrative. In the pre-practicum interview she emphasized that, as well as fulfilling the requirements of educational laws, a teacher should use different sources of information to assess student learning (e.g., exams, games, surveys, cooperative projects), considering the evolution of the student with a pre-post assessment and using self and peer-assessment. She also criticized how teachers in the field of PE were using assessment:

I don't think there is a single teacher, or hardly anyone, that considers the assessment system that he or she is implementing, and that it is really measuring knowledge. The main theory is that you should see if your pupil has improved from his baseline, but now it is more a case of washing your hands of it in case you have an inspection.

Participant 4, Leticia, pre-practicum interview

By the end of the practicum period, it seemed that she had changed her mind, proposing tools in her assessment task that were "not the most adequate, but the most comfortable" (post-practicum interview) and accepting that her ideas on formative assessment were hard to implement, so it was better to do easier things:

I think it has been a shock with reality; what you were suspecting is true: it's very hard to implement the assessment system you like so much (...) I think assessment does not enhance something positive apart from their implication [for the students] because they get a grade, and you fulfil your requirements and the course is valued, but assessment itself is not so important.

Participant 4, Leticia, post-practicum interview.

RQ3. What assessment tools and strategies do pre-service teachers design at the end of the practicum?

At the end of the practicum, tasks and post-interviews showed that participants considered a number of assessment tools and strategies to implement as future PE teachers.

Concerning assessment tools, the rubric was the most widely used tool as it was included in almost three quarters of the tasks analyzed (13). The checklist was also widely used by slightly more than half of the participants (10). The tasks included other tools, but proposed by a minority of students, so we do not analyze them in depth. Some examples of these tools are session diaries, record sheets, video recordings, and a written task.

When asked about the suitability of rubrics and checklists in the interview conducted after the practicum period, the participants' responses indicated that this was due to their facility of design and use. This testimony exemplifies it:

They are quite simple to understand and have all the indicators in place for the teacher at the time of having to use it.

Participant 1, Raquel, post-practicum interview.

With regard to the rubric, they also pointed out the importance given to this assessment tool during their master's training, also explaining its implementation through educational apps (e.g., Additio). Some participants pointed out that during the practicum they saw it was useful and easy to apply when they observed how it was used by their tutors:

I've seen it with other teachers at school, with a tablet it was the most comfortable ... you click on it and you see it, it's like you have it clearly established, the rubric, you see if it is fulfilled or not because

each aspect is described. I think it's the easiest, you have to create it and it's a hard work, but once you have it, I think it's very easy.

Participant 5, María, post-practicum interview

Regarding assessment strategies, we found that shared assessment is not very frequent, as co-assessment only appears in eight tasks and self-assessment in five tasks. However, in the pre-practicum interviews, the idea of involving pupils in the assessment process was expressed by more than half of the participants (10), which suggests that during the practicum this approach was no longer viable for some of them, and they did not include it in their assessment tasks. As an example, we can highlight the case of participant 9 who, during the pre-practicum interview, considered co-assessment as a core part of his understanding of assessment. However, in the task he proposed a rubric in which 100% of the marks are given by the teacher confirming, during the post-interview, the alignment with his tutor: "In my case I did not put any self-assessment or co-assessment. I did not give it any weight and my tutor did not give it any weight either".

Looking more closely at the formative use of the assessment tools, only five of the rubrics were used formatively. For instance, these rubrics are not only designed for the teacher to evaluate but also serve as a method of self- and co-assessment. We found that four of them were used for self-assessment or co-assessment, in two cases even proposing the same rubric both in the teacher's assessment and in the self-assessment (participants 2 and 3). In addition, all the pre-service teachers that proposed these rubrics agreed that they should be shared with the pupils before the assessment. As this participant points out:

Because in the end what I have experienced as a student is that I gave in an assignment and I thought I don't know Then I received a mark and I didn't know why the assignment was given a 5 or a 10, I wasn't sure (...) The best thing is that the rubric should be available and everyone can see it before giving in the assignment itself. So, it's not a question of catching people by surprise, but rather this is what I ask you to do and if you do it you will get this mark and there will be no surprises

Participant 11, Julia post-practicum interview.

Another point to consider in the assessment tools and strategies is the importance (and weight) that pre-service teachers give to behavioral components. Behaviors such as using equipment properly, wearing sport clothes, and task engagement are considered important learning outcomes in PE. Only six tasks did not include these aspects as assessment criteria. In the 12 tasks where they were reflected, it is the teacher who assesses them (8), while in the remaining four it is done only by self-assessment or by a combination of self and co-assessment, with the rubric being the most widely used tool. As for the weight these aspects have in the mark, the range is between 10% and 40%, which shows the importance of this matter for future teachers. As one of the participants pointed out:

I think it is something important, especially in the subject of Physical Education, to have predisposition, attitude, willingness to work. It's not just about physical condition, it's also about putting in the effort, being a bit motivated, being interested in improving, in progressing, and I think that this is important and should have some weight.

Participant 13, Andrea, post-practicum interview.

4. Discussion

The aim of this study was to analyze the impact of a supervised practicum on the assessment conceptions and practices of pre-service PE teachers. Below, we discuss each research question separately, and then present some limitations, general conclusions, and implications.

Our RQ1 explored the impact of the practicum in assessment conceptions of pre-service teachers based on Brown's categorization (2008).

We have not found studies applying Brown's theoretical approach of conceptions of assessment with pre-service PE teachers, although there is a study that includes a group of this specialty as part of the sample in primary school (Brown & Remesal, 2012). In this regard, it should be noted that both the cultural context and local factors (including teaching specialty) can condition their conceptions of assessment (Brown et al., 2019). In the Spanish context, the various educational laws enacted over the last few years (four laws since 2002, with the last one approved in 2020), seem to direct assessment towards aspects focused on certifying student learning and, to a lesser extent, improving teaching and learning. Student accountability was the dominant category but, in accordance with the results by Lutovac and Flores (2022), participants in this study held ideas compatible with different conceptions of assessment.

Considering that our results show less attention to school accountability, except for aspects related to legislation, and more concern for improving learning and student accountability (something that is confirmed in the assessment tasks designed by the pre-service teachers), we align with Remesal (2011), who points out the prevalence of societal conceptions of an 'assessment of learning' over an approach of 'assessment for learning' in teachers' conceptions, which would be more likely to improve the teaching and learning process.

Regarding RQ2, we analyzed the experiences of pre-service teachers with assessment practices during the teaching practicum. Results show that assessment is a key aspect for pre-service teachers and the practicum provides them with a great opportunity to see how it works in real settings (Prastikawati et al., 2022), although they recognize that it is one of the most complex elements of teaching (Hortigüela Alcalá et al., 2021). Pre-service teachers recognized their experience is still limited and their approach to formative assessment was mainly theoretical, so in many cases they did not yet feel confident to implement it (DeLuca, Chapman-Chin, & Klinger, 2019). For these reasons, participants emphasized that it was very difficult to implement the contents on formative assessment they had learned during their studies.

López-Pastor (2013) highlights that a significant factor hindering the adoption of formative assessment techniques among PE teachers is not only the time-intensive nature of these methods, but also the insufficient training available for their effective initial and ongoing implementation. It is also necessary to highlight the influence of the tutor during the practicum on pre-service teachers' perception of assessment. Xu and He (2019) noted that tutors may give or withhold opportunities for pre-service teachers to reconsider and change their conceptions of assessment and to enhance assessment literacy development during the practicum. Although many participants in our study criticized their tutor's assessment approach as subjective and often based only on traditional exams of physical performance (something already pointed out by López-Pastor et al., 2006) the assessment tasks they proposed were not fully formative in nature. In fact, our data reveal that the practicum either reaffirms the perception of formative assessment that the pre-service teachers previously had or, on the contrary, exerts a negative influence resulting in a shift to a more summative view of assessment, attributable, in part, to the influence of their tutors.

Finally, our RQ3 dealt with the analysis of the assessment tools and strategies that the participants designed at the end of the practicum. When asked to design assessment activities, we see that many tasks did not mobilize students as responsible for their own learning and their justifications were not based in the main strategies of assessment for learning presented in the introduction (Tolgfors, 2018; Wiliam, 2011). Participants chose those assessments practices that make them feel more confident (i.e., rubric and checklists), due to their facility of design and use. However, using these tools simply does not guarantee an impact on students' learning (Fraile, Panadero, & Pardo, 2017). It is essential that students have access to assessment tools from the beginning and that they are used in a formative manner, something that only occurs in five of the assessment tasks analyzed. As Andrade and Valtcheva (2009) noted, many teachers who employ rubrics use them as a guide to grade

their students' work so students do not have access to this rubric, limiting its formative dimension. The main feature of this instrument is that it can provide process-oriented feedback and thus improve student learning and teaching capabilities (Panadero & Jonsson, 2013), an idea shared by the participants in our study but which only a few included in their assessment proposal.

As noted by Hortigüela Alcalá et al. (2021), secondary school PE instructors persistently conflate assessment with grading. They predominantly endorse a teacher-centric approach, primarily centered on grading physical fitness and sports skills. This approach unavoidably influences the assessment perspectives of pre-service teachers, as demonstrated in this study. Additionally, authors such as Siedentop (2002) point out that the factors of success in PE teaching should be focused on the achievement of specific learning objectives. However, our results show that in the conception of assessment of future PE teachers, behavioral aspects (e.g., attitude, effort, participation, etc.) still have an important weight. Although these features may be relevant in a PE setting, they should be prerequisites, not learning targets (Melograno, 2007; Tolgfors, 2018). López-Pastor et al. (2005) went further when they point out that this is one of the reasons why PE has low prestige and limited school and social recognition, since what is evaluated-qualified is what the student is, not what the student has learned, nor what the teacher has taught.

4.1. Limitations and future lines of research

There are limitations to this study that must be considered. First, the only sources of data were the pre-service teachers' points of view (i.e., interviews and tasks). It would have been interesting to collect data including the perspective of the tutors. Second, the participants came only from one specialty (PE). For further studies, it would be interesting to analyze the impact of the practicum on other specialties. Third, the only requirement for tutors was to have a minimum of three years of professional experience, regardless of their specific training regarding assessment. Finally, not all participants implemented the assessment task designed as they did not have full professional responsibility. In this regard, for future lines of research, it would be interesting to study how teachers conceive and implement assessment when they start their professional service. The complementary use of quantitative data with larger samples could provide a better perspective of the phenomena studied here.

5. Conclusions

This study provides practical and theoretical implications for teacher educators, researchers and teacher education managers about assessment conceptions and practices of pre-service teachers.

Firstly, a supervised practicum should be adequately planned (i.e., choice of schools and tutors), as it can provide pre-service teachers with the opportunity either to see how assessment techniques are implemented in a real situation or even to apply them by themselves to improve their confidence. As Kyttälä et al. (2024) point out, the lack of studies and training experience with assessment can lead to negative conceptions on assessment.

Secondly, studies such as that by Molina and López-Pastor (2019) show that teachers tend to perform the evaluation in a similar way to how they experienced it as students in university training courses. Hence, not only is it important to reinforce the content related to formative assessment in the curriculum of university initial teacher training courses, but also to implement it in bachelor's and master's courses to provide a more complete experience for students. In addition, specific assessment courses need to be offered not only to pre-service teachers but also to in-service teachers (especially if they are tutors), to use assessment as a tool for learning, using a variety of assessment instruments and providing reliable, formative, and valid assessments (Levy-Vered & Nasser-Abu Alhija, 2018).

Finally, in our study, the pre-service teachers experienced a conflict between the coherence of the theoretical model and the practical difficulties they faced when they thought about its implementation. Therefore, when teaching formative assessment contents, it is essential to connect theory and practice and to emphasize strategies and tools that could be easily applied in terms of effort and time and material resources.

As a conclusion, the results of our study emphasize the importance of the practicum as a critical period to consolidate assessment conceptions and practices of pre-service teachers. We have offered some suggestions to improve assessment literacy for future secondary education teachers in general, and some ideas specifically focused on the assessment of PE.

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CRedit authorship contribution statement

Rodrigo Pardo: Writing – review & editing, Writing – original draft, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Daniel García-Pérez:** Writing – review & editing, Writing – original draft, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Ernesto Panadero:** Writing – review & editing, Writing – original draft, Project administration, Funding acquisition, Formal analysis, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The authors do not have permission to share data.

ANNEX 1.

SEMI-STRUCTURED INTERVIEW GUIDE: initial interview.

- Briefing explaining the objectives and the terms of the participation.
- Assessment training received at undergraduate and postgraduate level.
 - What assessment training have you received during your undergraduate studies?
 - Have you done your undergraduate teaching practice in secondary education? If so, what was your experience with assessment?
 - What assessment training have you received during your master's degree?
 - To what extent do you consider that this training has influenced your understanding of assessment?
- Conceptions of purposes and constraints of assessment.
 - Could you give me an example of an assessment activity that you would use in your classes? What do you think are the aims of such an activity?
 - What do you think is the purpose(s) of assessment?
 - What do you think is the best way to assess (e.g., exams, test, projects, self-assessment, co-assessment, etc.)?

- In what ways do you think information about student learning can be collected?
 - What conditions do you think should be taken into account when designing your assessment activities?
- Disciplinary specificities.
 - Are there specific aspects of physical education that affect how assessment is carried out in this course?
 - If so, what are they and how do they affect it?
 - Training expectations during the practicum and the teaching profession.
 - How do you think the practicum might affect your knowledge of assessment?
 - How important do you consider the acquisition of knowledge about the use of assessment is as part of your teacher education?
 - What knowledge and skills do you think are most important for teaching?
 - What motivated you to become a teacher?
 - Teacher typology according to their conception of assessment (based on Brown's model, 2008). Show written sentences to the interviewees. What does this statement mean to you?
 - "Assessment demonstrates the quality and accountability of schools and teachers". To what extent do you agree or disagree with this statement? (From 1 to 5 and explain why)
 - "Assessment makes students accountable for learning" (1–5)
 - "Assessment improves teaching and student learning" (1–5)
 - "Assessment should be rejected because it is invalid, irrelevant, and has negative effects" (1–5)
 - Final. Is there anything else you would like to comment about assessment?

ANNEX 2.

SEMI-STRUCTURED INTERVIEW GUIDE: final interview.

- Briefing explaining the objectives and the terms of the participation.
- Experience with assessment during the practicum.
 - What kind of assessment was carried out during the practicum?
 - Were you able to participate in assessment tasks during the practicum? How did you feel? What did you like the most? What difficulties did you find? If you had to repeat the experience, what would you change?
 - What do you think about your tutor's way of assessment?
 - In the case that you had also a practicum experience during undergraduate studies, what differences did you find with regard to the assessment?
- Based on the assessment task that they have designed.
 - Are there differences between the assessment you have designed and the one your tutor carried out during the practicum?
 - Based on your task, can you explain the different weights you have given to the assessment depending on whether it is carried out by the teacher or by the students, either with self-assessment or co-assessment?
 - Assessment instruments:
 - Justification of the proposed instruments: why do you think they are the most appropriate?
 - Do you consider it appropriate to share the assessment instruments you are going to use (e.g., rubric) with the students at the beginning of the didactic unit, or do you prefer to do it directly on the day of the exam?
 - With the assessment instruments you have proposed, do you think it is feasible to carry out the assessment?
 - Distribution of the assessment weight:
 - Do you consider that attitude should have a specific weight in the assessment? Why?
 - In the case that a rubric has been included.

- Briefly explain the rubric you have proposed based on the maximum and minimum marks you have given.
 - Assessment activities. According to your proposal (A or B):
 - A: Why do you think it is better to assess this content through an approach focused on the technical gesture isolated from the playing action?
 - B: Why do you think it is better to assess this content through an approach focused on the playing action rather than on the individual technical gesture?
 - Curricular adaptation:
 - Have you considered any curricular adaptations in your assessment?
 - What would you do for those students who do not have any special educational needs or are injured at the time of the assessment?
4. Concluding.
- After completing your teacher training:
 - To what extent do you think that the practicum has influenced your conception of assessment?
 - To what extent do you think the assessment training you received in the bachelor's and master's programs will help you in your future teaching?
 - What do you think is the purpose(s) of assessment?
5. Final. Is there anything else you would like to comment about assessment?

ANNEX 3.

ASSESSMENT TASK.

Objective: to design the assessment of a teaching unit implemented during the practicum.

What we are going to do: you must design the assessment of a teaching unit implemented during the practicum with your monitoring group. Even if your tutor has made an assessment, the idea is that you make your own assessment, designing the assessment tools and activities that you consider most appropriate and that do not necessarily have to correspond to those of your tutor.

The task should include the following sections:

1. Course and group: general characteristics of the class group (age, number of students, gender, etc.).
2. Content: based on the legislation in force. If the content does not coincide with what is required by law, justify the reason.
3. Assessment perspective: you should explain, in general terms, how you think is the best way to assess this content. Include here the differences, if any, with respect to the assessment made by your tutor.
4. Assessment criteria and learning standards: based on current legislation.
5. Assessment tools: include the tools and the weight of each one of them. They can be your own creation or adaptations of other existing ones (in that case, refer to them in the references section).
6. Assessment activities: explain how you are going to use the assessment tools you have designed.
7. Sequencing: indicate the total number of sessions of the teaching unit and specify in which ones the assessment activities are going to be implemented.
8. References: in case you have used any existing resource.

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