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Teachers Learn About Student Learning Assessment through a Teacher Education Process

Antoni Badia^a and Lucrecia Chumpitaz-Campos^b

^a Faculty of Psychology and Education Sciences, Universitat Oberta de Catalunya, Barcelona, Spain

^b Department of Education, Pontifical Catholic University of Peru. Lima, Perú.

Corresponding author: Antoni Badia. E-mail address: tbadia@uoc.edu. Full postal address: Rambla del Poblenou, 156, 08018 Barcelona (Spain)

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Abstract

This study aims to understand the extent to which university professors adopt new pedagogical voices in their learning assessment practices through a teacher education process. Participants (N = 32) were interviewed before and after the teacher education process, and data were analysed using qualitative and quantitative methods. The results of the study demonstrated, first, that teachers renamed their educational discourse about learning assessment significantly, increasing it in assessment for learning practices, particularly in the themes of timing and agents, and reducing it in all themes referred to the assessment of learning practices. And second, three clusters of faculty were identified, which differed in terms of the way they merge both learning assessment practices: professors with a slight prevalence of the assessment for learning conceptual voice, professors with a slight prevalence of the assessment for learning practical voice, and professors with a strong prevalence of the assessment for learning voice.

Keywords

Assessment for learning; teacher learning; teacher education process; higher education

Highlights

Teachers renamed their educational discourse about learning assessment significantly.

Teachers increased their discourse about assessment for learning practices.

Teachers learned more in the themes of timing and agents.

Three clusters of how teachers increased their discourse were identified.

Introduction

For the past two decades, many relevant educational theoretical frameworks have been used to deepen our understanding of how teachers learn and change their educational practice. For example, the cognitive theory studied how a teacher acquires professional knowledge (Putnam & Borko, 2000); the situated learning theory analysed how a teacher could gain access to the complex, critical thinking used by expert teachers in their classrooms (Leaman & Flanagan, 2013); certain views on teacher education tried to integrate both models (Korthagen, 2010); the socio-constructivist approach explained how teachers can learn in communities of practice (Cochran-Smith & Lytle, 1999), and the Vygotskian approach examined how teachers can learn within their zone of proximal development (Warford, 2011).

The recent emergence of new perspectives on teacher learning based on the development of the teacher identity and the dialogical self-perspective pose new unanswered questions about how teachers learn, and which are the main mechanisms used for learning (Akkerman & Meijer, 2011).

Whereas learning assessment of students is widely considered central to student learning (Mulliner & Tucker, 2017), little is known about how teachers learn about it according to the dialogical learning view. In this work, student learning assessment will be considered as the set of teachers' actions intended to promote formative assessment for learning, as tasks conducive to appropriate student learning approaches, and also to promote summative assessment for certification (Carless, 2015).

This study was designed focusing on understanding and explaining the extent to which teachers learn certain pedagogical content about formative and summative assessment, focusing on the dialogical learning mechanism of the teacher's appropriation of educational discourse.

Teacher learning: A process of appropriation of discourse about teaching practice

In Freeman's (1993) earlier work, teacher learning was conceived as a dialectical process, which includes two specific mechanisms through which teachers develop a new understanding of their practice: renaming experience and reconstructing practice. While reconstructing practice refers to the process of developing new teaching actions in the classroom, renaming experience consists in teachers critically reflecting, renegotiating, and assigning new meanings to their teaching practice.

Appropriation of discourse will be defined as a particular process of renaming experience about teaching practice. The meaning of "appropriation" as used here derives from the contributions of Bakhtin (1991), and it refers to how agents are involved in processes of mastering skills through the adoption of cultural tools and mediational means that belong to others and make them their own (Wertsch, 1998). From this view, teacher's appropriation will be conceived as a dialogic learning process where teachers appropriate the meanings from others *adopting them as their own* pieces of discourse, and progressively interlinking them with their own teacher voice (Wertsch, 1991). According to Matusov and von Duyke, (2009), pieces of discourse that contain words, ideas, approaches, knowledge, or feelings could be appropriated by individuals.

Gee (1990) defines *discourse* as "a sort of 'identity kit' which comes complete with [ways] to act, talk, and often write, so as to take on a particular social role that others will recognize" (p. 142). Academic discourse is a type of discourse that is very relevant to teacher learning, which can be commonly used in teacher education processes. The need for teachers to 'appropriate' academic discourse is a basic educational principle in both pre-service and in-service training. According to Badia and Becerril (2016), "academic discourse is research-based and propositional knowledge produced primarily by university-based researchers and scholars in various disciplines, and includes educational, didactical, and psychological theories, conceptual frameworks, and strategies for teaching" (p. 225).

The process of teachers' appropriation of different meanings embodied in academic discourse has been described by several research works on the topic of teacher education processes. For example, Hadwin, Wozney, and Pontin (2005) demonstrated how the appropriation of teachers' discourse about their self-regulatory activity can be scaffolded. In this case, we analysed the process of discourse appropriation by a group of professors

regarding the use of a portfolio in a learning assignment where they were asked to provide evidence of the competences they had acquired on research methods. In the same vein, Badia and Becerril (2016) showed how teachers appropriated academic discourse into professional discourse by means of three types of professional discourse articulation, that consists of using categories belonging to a theoretical classification to analyse teaching practice, applying a theoretical concept or idea to understand teaching practice, and using theoretical terms to describe teaching practice. Finally, Davin, Herazo, and Sagre (2017) examined the process by which the professors implemented dynamic assessment in their classrooms, and at the same time expanded their professional discourse about dynamic assessment with varying degrees of appropriation.

As a result of the appropriation of academic discourse process, the professors are able to change their voice about one or more education topics. Teachers can appropriate certain meanings and adapt and use them for their own purposes through their personal voices and, in that way, these meanings become part of the teachers' thinking and reasoning, thus guiding their new teaching practice (Akkerman & Meijer, 2011). According to Bakhtin (1981), a *voice* involves the individual's speaking personality, the subjective speaking consciousness of a human being. Because there are multiple ways of representing reality and thinking about solutions to approach a problem, there may be several different forms of speaking and thinking (voices) that may be invoked on particular occasions (Wertsch, 1991). In the field of teachers and teaching, a teacher's voice is made up of many interrelated meanings (e.g., conceptions, beliefs, and emotions) and represents a certain way of thinking and acting in connection with a particular aspect of teaching and learning (Akkerman & Meijer, 2011).

Teaching practices about learning assessment in higher education

In the educational literature developed for analytical purposes, a clear distinction has been made between two types of assessment practices in higher education: assessment *of* learning and assessment *for* learning (Hernández, 2012). From the teacher's perspective, each category of learning assessment is clearly characterised by its own values and meanings (Leach & Scott, 2003).

Assessment of learning in higher education has also been called summative assessment (Knight, 2002). Assessment of learning consists of testing or accumulating evidence regarding each student's learning outcomes over time, at the end-phase of the level or at transition times. Summative assessment is an important process in higher education for the purpose of accountability and certification (Maclellan, 2004).

Assessment for learning (Kearney, 2013; Sambell, McDowell, & Montgomery, 2012) has also been defined as formative assessment (Nicol & Macfarlane, 2006). Several key characteristics are that assessment for learning is a part of the teaching and learning process; that it is central to classroom practice and is sensitive to the learning process; that it includes constructive teaching guidance, and that it promotes students' motivation and engagement. Feedback has been widely considered central in the assessment for learning practice in higher education (Mulliner & Tucker, 2017).

Despite these differences, both types of learning assessment—formative and summative—are needed in the educational practice because learning assessment is considered a key component of the teaching and learning cycle (Kearney, 2013). Consequently, new integrative assessment frameworks have emerged; these combine both assessment practices into a single perspective. Learning-oriented assessment processes are an example of these new assessment perspectives, which include three interrelated processes: assessment tasks are considered learning tasks, the professor is involved in the development of the students' evaluative skills, and feedback is used as feedforward (Carless, 2015).

Even though this integrated learning assessment perspective is being progressively accepted in the academic educational field (Lau, 2016), its transference to educational practice has been slow and difficult, especially in higher education (Carless, Salter, Yang & Lam, 2011). One of the main factors that hinders transference of this integrated learning assessment perspective to the educational practice is the academics' beliefs regarding the integrated perspective of learning assessment. While the summative assessment approach is well understood among academics, several key aspects of formative assessment, such as the teachers' perception regarding the usefulness of feedback, are still under discussion (Bailey & Garner, 2010; Mulliner & Tucker, 2017).

According to the theoretical framework adopted here, the concept of learning assessment of students can be conceived as a type of educational discourse (Bakhtin, 1986), which includes, as reference content, the concepts, ideas, and points of view related to all learning-oriented assessment practices (Carless, 2015). The outcome of the teacher's appropriation of discourse about learning assessment will be a new teacher's subjective voice about this educational topic, i.e., a new teacher's subjective speaking personality that brings forward a particular perspective about an educational topic (Akkerman & Meijer, 2011), in this case about learning assessment.

The new perspective about the field of teacher learning from a dialogical viewpoint could be useful to recognise to what extent teachers could adopt a new educational discourse from the formative assessment approach in teacher education processes on this topic (Akkerman & Meijer, 2011; Freeman, 1993). In order to explore more in-depth the currently available knowledge about this educational field, we identify two research questions:

Research Question 1: To what extent do teachers appropriate the discourse about student learning assessment?

Research Question 2: Are there differences among the teachers' voices about student learning assessment?

Method

The teacher education process

The main goal of the teacher education process was to generate new teachers' voices about assessment for learning. An additional objective was to develop skills related to the design of new educational practices, which include assessment for learning. For this purpose, the process design took into account the following instructional principles: a) participants must experience the formative assessment as learners; b) participants should learn new knowledge by combining educational academic information with educational practice information; c) participants should learn through teacher reflection on their own teaching practice; and d) participants should develop their skills by engaging in authentic learning tasks.

The teacher education process was carried out virtually in PAIDEIA, a learning environment currently found on the Moodle platform that has been tailored for the Pontifical Catholic University of Peru (Pontificia Universidad Católica del Perú - PUCP). Teacher education activities were designed, and they met the following criteria: First, the activities were common tasks in the context of online continuing education programmes. Second, they were independent but sequential tasks that responded to a didactic sequence. Third, they were mostly individual activities, but there were also collaborative activities that were presented didactically to promote change in the professors' pedagogical knowledge. Finally, the proposed activities were intended to be experiential, situated, and reflective, which could be strategically used to stimulate change.

The teacher education process lasted eight weeks. Each week focused on specific goals. During the first week, participants elaborated a brief description of their experience in assessing student learning in higher education and the areas in which the participants wanted to improve. In the second and third weeks, participants were required to discuss and collaboratively construct the concept of assessment for learning, and then to elaborate a personal definition of the concept individually. In the fourth week, participants had to redesign the syllabus of one of their current courses, while taking the assessment for learning characteristics into account. After that, they had to present their new syllabus to the other participants for feedback. During the fifth week, teachers wrote up a critical incident analysis guide related to the assessment for learning, following the Guideline for the Analysis of Critical Incidents, which had been previously implemented by Monereo, Weise, and Alvarez (2013). In the sixth and seventh weeks, participants collaboratively reflected on these critical incidents and proposed possible solutions. In the final week (closing of the teacher education process), professors gathered and shared their opinions on the extent to which participants had developed their teaching skills. During the eight weeks, participants used an e-portfolio to compile and present evidence of their reflections, understanding, and changes in how they explained their teaching practice and their voices about learning assessment.

Participants

Thirty-two professors participated in this study, the same who participated in the teacher education process. All participants were university faculty who taught undergraduate courses at the Pontifical Catholic University of Peru. Twenty-one participants were male and eleven were female. Nine participants were between 25 and 35 years old, six participants were between 36 and 45 years old, twelve participants were between 46 and 55 years old, four were between 56 and 65 years old, and one was over 66 years old.

Six participants had a bachelor's degree, twenty-three had a master's degree, and four had a PhD. Nine participants taught in the field of Engineering, six in the field of Education, four in the field of Arts and Humanities, four in the field of Science, four in the field of Law, three in the field of Economics, and two in the field of Psychology. All professors had at least five years of teaching experience. No one had previously attended specific training processes on learning assessment.

Data collection

Data were collected between January and July 2014 by one of the authors. The data collection was performed using an in-depth, semi-structured interview, which was conducted face-to-face for each participant twice, both before and after the teacher education process. The first interview was administered during the month before beginning the teacher education process, and the second during the month after completing said process. Both interviews took place in the same location with the same interviewer, aim, structure, and duration. The shortest interview lasted 45 minutes and the longest interview, 75 minutes.

Both semi-structured interviews were designed to capture the educational voices expressed by each teacher related to the matters of summative and formative learning assessment. Taking into account the contributions of Taras (2005) and of Postareff, Virtanen, Katajavuori, and Lindblom-Ylänne (2012), the questions included in the interviews focused primarily on extracting information about five main themes: conception, object, timing, agents, and procedure of the learning assessment. We consider that these five themes cover a very wide range of topics referred to learning assessment practices in higher education.

Data analysis

The utterances that were obtained from individual interviews captured the teachers' voices about the teaching and learning process. Deductive content analysis is an approach that has proved useful to examine the nature of these contributions in teachers (DeCuir-Gunby, Marshall, & McCulloch, 2011). De Wever et al. (2006) considered that an appropriate approach to content analysis should have a clear theoretical framework of reference, an operational definition of theoretical concepts, and a set of coherent categories.

According to the theoretical framework, two complementary sets of categories were used to analyse all contributions: Type of learning assessment and themes of learning assessment. The two types of learning assessment presented in Table 1 capture the different voices that teachers used to talk about assessment practices in higher education (Hernández, 2012). The five assessment practice themes represent five types of conceptual characteristics of each learning assessment and match the themes taken into account in the semi-structured interview administered for data collection (Postareff, Virtanen, Katajavuori, & Lindblom-Ylänne, 2012; Taras, 2005).

Table 1. Coding scheme used to categorise the types of teachers' voices regarding learning assessment (A and B) and the five themes

	Voice A. Assessment of learning	Voice B. Assessment for learning
Theme 1. Conception of learning assessment	Professors emphasised that the assessment function is geared mainly towards checking students' knowledge and is thus more oriented to results than processes. Using summative assessment methods, the teachers' voices emphasised the measurement of learning from a classical conception associated with the measurement of academic performance currently focused on conceptual knowledge.	Professors emphasised the value of formative assessment and its importance in influencing students' learning. According to these professors, the purpose of assessment is to promote student learning. In that sense, assessment can help students learn by providing information through feedback for improved learning.
Theme 2. Object of learning assessment	Professors referred to the content of the assessment; they stated that they currently assessed the acquisition of conceptual knowledge about the subject-matter of their course. However, attitudes were hardly integrated. Professors used written tests to collect information about	Professors considered the importance of not only the conceptual content but also the procedural content and attitudinal content commonly related to the skills. This reflects a more holistic conception of learning, which is conceived as the development of skills and, along that

	conceptual learning outcomes. Both professors and institutions wanted to ensure objectivity.	line, said skill development and achievement is what is being assessed.
Theme 3. Learning assessment timing	Professors indicated that they assessed learning either in the middle or at the end of the course using time periods limited to the current class duration.	Professors mentioned that assessment must be done at different times, not only at the end of the course, emphasising that it is necessary to introduce assessment throughout the entire educational process: at the beginning, during, and at the end. This coincides with the types of diagnostic, formative, and summative evaluations.
Theme 4. Learning assessment agents	Professors claimed that the only person who established the assessment criteria and procedures was the teacher. The students had a passive role in learning assessment and were only recipients of the consequences of marks. Professors also mentioned institutional factors that influenced the agents who could assess in this educational context.	Professors indicated that other agents—mainly the students—must be considered. Students are required to become evaluators of their own work. To do so, they must be involved, as active participants, in the evaluation process and they must develop skills to self-regulate their own learning process.
Theme 5. Learning assessment procedure	Professors discussed the learning assessment procedures currently associated with procedures belonging to the summative assessment position. Some examples of these procedures are that teachers decide the learning assessment criteria and the time when they communicate it to students or the students' marking processes.	Professors emphasised the importance of developing educational procedures belonging to the formative assessment position. Two of these procedures may include defining the assessment process to have a positive influence on the learning process and negotiating and sharing assessment criteria with students.

The thematic unit was applied as the unit of analysis to maintain the meaning of each textual fragment. Thus, each thematic unit could be identified because it referred to a single theme. In some cases, the thematic unit was an utterance; in other cases, it was a set of utterances.

The Atlas/ti 6.2 program was used to categorise data following three steps. First, all interview data were transcribed verbatim. Second, textual fragments of the participants' interview answers were segmented into thematic units. Third, each thematic unit was allocated to two categories: one related to types of learning assessment, and the other related to types of themes. Table 1 summarises the entire categorisation and Appendix 1

provides some illustrations of each category. Finally, every thematic unit was codified using three codes. For example, the thematic unit codified as [P11, A4, 2] was produced by participant P11, and corresponds to categories A and 4 (A. *Assessment of learning*, and 4. *Agents*).

Two independent analysts rated 20% of all the thematic units. The inter-rater agreement between the classification of researchers and each one of the two independent analysts was 90% and 74%, respectively.

In order to answer research question 1, a set of statistical analyses of frequencies and paired sample t-tests was conducted. The mean difference between the number of thematic units that appeared in both interviews before and after the teacher education process in the five learning assessment themes was calculated. Three sets of t-tests were then carried out for the total number of thematic units, the number of thematic units in learning assessment A, and the number of thematic units in learning assessment B. Levene's test was used to assess the equality of variances. When the test proved to be significant, Welch's correction was performed.

Two-step quantitative data analysis was used to analyse data regarding research question 2. All data used came from the interviews after the teacher education process. In the first step, a hierarchical cluster analysis (HCA) to classify cases using Ward's method was used. Data used were the total number of thematic units in each of the five learning assessment themes. The final number of clusters was selected based on the mean of a silhouette plot (see Figure 1), the predictive validity of the clustering variables, and the interpretability of the cluster solutions. The second step consisted of comparing those clusters of cases with data from the thematic units of each five learning assessment themes in each type of learning assessment. The non-parametric Mann–Whitney U test was ran between each pair of data included in two of the three clusters.

Findings

Research Question 1: To what extent do teachers appropriate the discourse about student learning assessment?

The results presented in Table 2 identify several significant differences between the teachers' utterances voiced before and after the teacher education process.

Table 2. Differences in the quantity of thematic units of the five learning assessment themes depending on the time when the voices were expressed (Before - After the teacher education process) (N = 32)

		All thematic units		A. Assessment of learning		B. Assessment of learning	
		Before	After	Before	After	Before	After
Conception	M (SD)	3.15 (1.28)	2.67 (1.67)	0.94 (1.21)	0.32 (0.54)	2.21 (1.27)	2.35 (1.70)
	F (%)	94 (19.83)	91 (23.39)	32 (17.20)	11 (26.83)	62 (21.53)	80 (22.99)
		$t = -1.321$		$t = -2.716^a$		$t = 0.442$	
Object	M (SD)	2.88 (1.25)	2.03 (1.11)	1.06 (1.04)	0.35 (0.60)	1.82 (1.14)	1.68 (0.95)
	F (%)	111 (23.42)	69 (17.74)	36 (19.35)	12 (29.27)	75 (26.04)	57 (16.38)
		$t = -2.825^b$		$t = -3.376^b$		$t = -0.635$	
Timing	M (SD)	0.86 (1.11)	1.53 (1.02)	0.24 (0.50)	0.09 (0.29)	0.62 (1.07)	1.44 (0.99)
	F (%)	29 (6.12)	52 (13.37)	8 (4.30)	3 (7.32)	21 (7.29)	49 (14.08)
		$t = 2.644^a$		$t = -1.537$		$t = 3.322^b$	
Agents	M (SD)	2.59 (1.42)	2.09 (1.03)	1.91 (1.56)	0.21 (0.41)	0.68 (1.20)	1.88 (1.07)
	F (%)	88 (18.57)	71 (18.25)	65 (34.95)	7 (17.07)	23 (7.99)	64 (18.39)
		$t = -1.705$		$t = -6.196^c$		$t = 5.519^c$	
Procedure	M (SD)	4.47 (2.51)	3.12 (1.45)	1.32 (0.15)	0.24 (0.55)	3.15 (1.93)	2.88 (1.41)
	F (%)	152 (32.07)	106 (27.25)	45 (24.19)	8 (19.51)	107 (37.15)	98 (28.16)
		$t = -2.903^b$		$t = -4.839^c$		$t = -0.727$	
Total	M (SD)	13.95 (4.60)	11.44 (3.00)	5.47 (3.18)	1.21 (1.23)	8.48 (4.53)	10.23 (3.11)
	F (%)	474 (100)	389 (100)	186 (100)	41 (100)	288 (100)	348 (100)
		$t = -3.196^b$		$t = -7.453^c$		$t = 2.336^a$	

^a $p < 0.05$. ^b $p < 0.01$. ^c $p < 0.001$.

Taken together, data from Table 2 demonstrate that all themes used to classify types of teachers' voices on learning assessment were necessary because they reflected relevant aspects of each learning assessment. In addition, this was useful because it allowed us to compare the frequency of appearance in each theme before and after the teacher education process. More concretely, Table 2 shows that the learning assessment procedure is the predominant voice both before (32.07%) and after (27.25%) the teacher education process. Conversely, it seems evident that learning assessment timing is the weakest voice, 6.12% before and 13.37% after the teacher education process.

Focusing on all thematic units, the data show that the mean of the object ($t = -2.825$; $p < .01$), the procedure ($t = -2.903$; $p < .01$), and the total thematic units ($t = -3.196$; $p < .01$) is significantly lower after the teacher education process, whereas the mean of timing is significantly higher ($t = 2.644$; $p < .05$). Data from voice A indicate that the means of the utterances voiced by teachers after the end of the teacher education process are

significantly lower compared to those uttered before, in all categories: learning assessment conception ($t = -2.716$; $p < .05$), object ($t = -3.376$; $p < .01$), agents ($t = -6.196$; $p < .001$), procedure ($t = -4.839$; $p < .001$), and the total thematic units ($t = -7.453$; $p < .001$), except for learning assessment timing. Finally, data from voice B indicate that the means of the utterances voiced by teachers after the end of the teacher education process are significantly higher than those uttered by teachers before, with regard to timing ($t = 3.322$; $p < .01$), agents ($t = 5.519$; $p < .001$), and the total thematic units ($t = 2.336$; $p < .05$).

Research Question 2: Are there differences among professors in their voices about student learning assessment?

The results of the hierarchical cluster analysis are shown in Figure 1. This three-cluster solution divides participants into three groups: Cluster 1 with 11 participants, cluster 2 with 12 participants, and cluster 3 with 9 participants. The differences between the three clusters were statistically significant for the assessment for learning practices ($F = 22.774$; $p < .000$) but not for the assessment of learning practices ($F = 1.867$; $p = .172$).

Figure 1. Cluster *dendrogram*

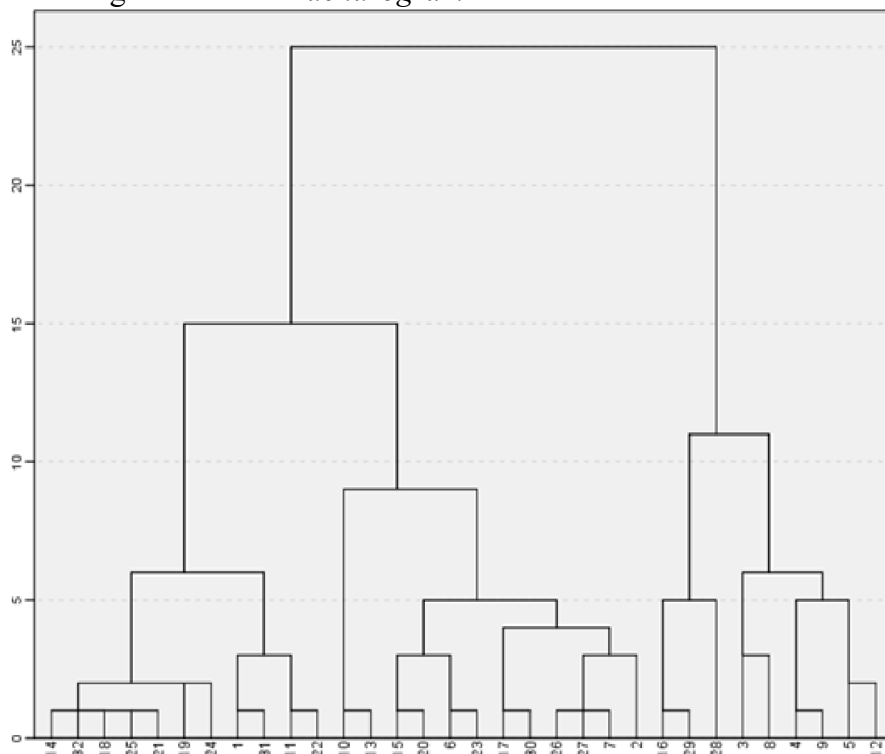


Table 3 shows the differences between the three clusters, which were statistically significant for the themes of conception A (K-W = 4.564; $p < .10$), procedure A (K-W = 5.854; $p < .05$), conception B (K-W = 13.625; $p < .00$), timing B (K-W = 6.978; $p < .05$), agents B (K-W = 4.673; $p < .10$), and procedure B (K-W = 20.672; $p < .00$).

Table 3. Differences between the number of thematic units of each theme in each type of learning assessment (A and B) on the three clusters of participants (N=32)

		Cluster 1 (n = 11)	Cluster 2 (n = 12)	Cluster 3 (n = 9)	Significance level
		M (SD)	M (SD)	M (SD)	
Conception	A	0.09 (0.30)	0.58 (0.67)	0.33 (0.50)	C1 < C2 ^b
Object	A	0.45 (0.69)	0.33 (0.65)	0.11 (0.33)	
Timing	A	0.18 (0.41)	0.00 (0.00)	0.11 (0.33)	
Agents	A	0.27 (0.47)	0.17 (0.39)	0.22 (0.44)	
Procedure	A	0.45 (0.69)	0.00 (0.00)	0.11 (0.33)	C2 < C1 ^b
Conception	B	2.09 (1.14)	1.17 (0.72)	4.00 (2.36)	C1 < C3 ^b ; C2 < C1 ^b ; C2 < C3 ^c
Object	B	1.64 (0.67)	2.00 (1.13)	1.33 (1.00)	
Timing	B	1.18 (0.41)	1.00 (0.60)	2.33 (1.41)	C1 < C3 ^b ; C2 < C3 ^b
Agents	B	1.36 (0.81)	2.17 (1.12)	2.22 (1.20)	C1 < C2 ^b ; C1 < C3 ^a
Procedure	B	1.45 (0.69)	3.50 (1.13)	3.89 (0.78)	C1 < C2 ^c ; C1 < C3 ^c

^a $p < 0.10$; ^b $p < 0.05$; ^c $p < 0.01$

Cluster 1 was labelled *teachers with a slight prevalence of assessment for learning conceptual voice*. These professors expressed a significantly higher number of utterances about voice B than voice A, but their number of utterances about Procedure A is significantly higher than Cluster 2 ($U = 42.000$; $p < .05$). In addition, their number of utterances about agents' B is significantly lower than Cluster 2 ($U = 36.500$; $p < .05$) and Cluster 3 ($U = 26.500$; $p < .10$), as well as about procedure B than Cluster 2 ($U = 6.000$; $p < .00$) and Cluster 3 ($U = 0.000$; $p < .00$). From the teaching view, these results indicate that the participants' voice in cluster 1 reflects a certain degree of awareness of the conception of voice B, but it does not reflect a proper understanding of how to put the timing, the agents, and the procedure regarding voice B in practice.

Cluster 2 was labelled *teachers with a slight prevalence of assessment for learning practical voice*. These professors expressed a significantly higher number of utterances about voice B than voice A, but the number of utterances about conception A is significantly higher than Cluster 1 ($U = 38.500$; $p < .05$) and the number of utterances about conception B is significantly lower than Cluster 1 ($U = 34.000$; $p < .05$). From the teaching view, these results indicate that the participants' voice in cluster 2 reflects a

certain degree of understanding of how the agents and the procedure work in voice B, but it reflects a low comprehension of the conception of voice B.

Finally, Cluster 3 was labelled *teachers with a strong prevalence of assessment for learning voice*. The professors in this group voiced a significantly higher number of utterances regarding conception B than Cluster 1 ($U = 19.000$; $p < .05$) and Cluster 2 ($U = 9.000$; $p < .00$), and regarding timing B than Cluster 2 ($U = 24.000$; $p < .05$), and cluster 1 ($U = 25.000$; $p < .05$). From the teaching view, these results indicate that the participants' voice in Cluster 3 reflects a higher degree of understanding of conception, timing, agents, and procedure of voice B.

Conclusions

This study was conducted to obtain a deeper insight into the teachers' dialogical appropriation of the discourse about learning assessment in the context of a virtual teacher education process, in two ways: the extent of appropriation of two types of discourse about learning assessment practices—assessment of learning and assessment for learning—and the identification of different outgoing teachers' voices about learning assessment at the end of the teacher education process.

We can conclude, firstly, that while participants have not increased the total number of utterances referred to the student learning assessment, results provide enough evidence to state that they have significantly changed the voices with which they think and ask about student learning assessment at the end of the teacher education process. We are convinced that data from Table 1 accurately show the professor's learning outcomes, in terms of the change in the number of utterances they are able to voice after renaming a particular aspect of their teaching practice (Badia & Becerril, 2016).

Secondly, our results showed that the assessment for learning voice provides teachers with most of the educational discourse with which they can understand and make sense of the student learning assessment. Two particular themes about assessment for learning practices, timing, and agents, have been clearly *privileged* (Bakhtin, 1986). In other words, teachers realised in the second interview that this voice is more appropriate than others to understand the assessment for learning practices (Werstch, 1991). In terms of

teaching, this means that teachers have appropriated certain notions included in these themes more easily, such as ‘learning assessment should be done at the beginning, during, and at the end of the teaching process,’ ‘feedback is important for learning,’ and ‘students can also be agents of assessment, either in peer-assessment or in self-assessment’ (Bailey & Garner, 2010; Mulliner & Tucker, 2017).

Thirdly, our findings also revealed that teachers continue to be sensitive to the assessment for learning approach, although the number of utterances voiced by teachers and related to this approach decreased significantly. We consider that these results support the idea that both approaches are not mutually exclusive (Lau, 2016), rather they can be included in a single assessment process, which has been called learning-oriented assessment process by Carless (2015).

Finally, the three ways in which teachers interweave both learning assessment voices in their practice should be considered an empirical evidence in favour of the idea that teachers might interpret the learning-oriented assessment process differently (Carless, 2015). These three teachers’ voices can be considered three different examples of ways to integrate formative and summative assessment practices in real education practice (Lau, 2016). Clearly, the professors in Cluster 3 voiced more utterances about assessment for learning.

Our study also highlighted the importance of the five analytical categories used to examine the teachers’ voices about learning assessment themes. These five categories can not only serve to understand the academics’ conceptions of assessment, but may also be useful in analysing the teachers’ potential variations in their learning assessment practices (Postareff, Virtanen, Katajavuori, & Lindblom-Ylänne, 2012).

The authors of this study are aware that the data collected reflected only the teachers’ discourse extracted by means of interviews, and these data were not sensitive enough to reflect changes in real teaching practices. Since teacher learning is conceived as a dialectical process of renaming experience while reconstructing practice, the question of how teachers implement changes in their teaching practice remains unknown (Freeman, 1993).

This study emphasises the need for teachers' educators to take in to account the processes of participants' dialogical appropriation of the educational discourse in teacher education. More concretely, we are convinced that teachers need less authoritarian discourses with static and literal meanings, and more internally persuasive voices that allow teachers to build their own voices about the educational language, which are the base of their pedagogical reasoning (Wertsch, 1991).

Statements on open data, ethics, and conflicts of interest

This research paper was developed in accordance with the ethical standards of the American Psychological Association (2010). Participants were informed in advance of the general aim of the research, its duration, and the procedure to collect, store, and analyse the information provided by them.

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Appendix 1. Illustration of each type of thematic unit, applying both types of categories

All selected teachers' voices illustrated the five themes of learning assessment in each of the two learning assessment voices. These teachers' voices could be seen not only as teachers' utterances but also as examples of educational discourses that populate the selves of the teachers who participated in teacher education processes.

Assessment of learning voice

Theme 1. Conception of learning assessment

The assessment is important because one has to measure how the students are taking advantage of the content that the teacher is giving them. It's important to know what the students have understood and to verify if learning has taken place. (P6, A1, 1)

Theme 2. Object of learning assessment

The selected utterance illustrates one teacher's voice regarding this theme: 'Subject content is assessed through written tests and essays. The main focus is assessing conceptual knowledge. That is what I assess.' (P17, A2, 1)

Theme 3. Learning assessment timing

The assessment is done only on specific occasions, during the course and at the end of the educational process. It is not necessary to evaluate students first because they don't know anything about what I am going to teach them, or they have forgotten about any previous knowledge. It doesn't make sense to evaluate them at the beginning. (P17, A3, 1)

Theme 4. Learning assessment agents

In my course, I am the only person who assesses because I am a teacher. No other person participates. The students do not intervene because this has been determined by the teacher, and also because this is already defined by the Faculty's coordination. (P32, A4, 1)

Theme 5. Learning assessment procedure

The university determines the instruments, dates, percentages, etc. We cannot change anything because there is already a qualification policy in the Faculty. We mainly assess with exams and practice. (P27, A5, 1)

The assessment for learning voice

Theme 1. Conception of learning assessment

Assessment for learning consists of a series of processes that professors and students use to generate information that supports learning. This model of formative assessment is differentiated and, at the same time, complemented by a summative assessment [...]. I want to emphasise an element that is central to assessment for learning: effective feedback (P20, B1, 2)

Theme 2. Object of learning assessment

The major reason to assess is the skills: the conceptual, procedural and attitudinal content, and to evaluate processes and products. The key is to have clear objectives and thus to improve the design and to be able to better select the tools to evaluate the concepts, procedures, and attitudes. (P5, B2, 2)

Theme 3. Learning assessment timing

Assessment is not only carried out in the final stage of the pedagogical activities, but it also accompanies us at all times as we realise our educational practices. Assessment must be permanent: at the beginning, during, and at the end. (P11, B3, 2)

Theme 4. Learning assessment agents

I think it is central because it is not only the teacher who is responsible for assessment, especially when we talk about assessment for learning. Both teachers and students should participate in the assessment process, including in the definition of evaluation criteria. (P26, B4, 2)

Theme 5. Learning assessment procedure

The assessment system, the teaching strategies, and the learning objectives must be clearly explained from the beginning of the course. It is important that the students know these aspects in a timely manner. In the case of assessment, the teacher should ensure that the students know what the assessment system is and what the corresponding instruments and dates will be. (P08, B5, 2)