

## Teaching conceptions and approaches: do qualitative results support survey data?

### Concepciones y enfoques de enseñanza: ¿Apoyan los resultados cualitativos a los datos cuantitativos?

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#### Abstract

*Introduction: This study examined preservice teachers' teaching conceptions and approaches measured quantitatively and qualitatively in order to identify any convergence of findings. Additionally, any changes in conceptions and approaches towards a student- or teacher-centred orientation upon completion of a training course were compared. Method: Preservice teachers completed a scale on approaches to teaching and answered open-ended questions on teaching before and after an initial teacher training programme. Results and conclusions: Inconsistencies in the results suggest that research on teaching and learning should use a combination of techniques in order to ensure that phenomena are accurately examined so that appropriate educational decisions are made.*

*Keywords: teaching; teaching styles; teacher education; qualitative research.*

## Resumen

*Introducción:* Este estudio analiza las concepciones y enfoques de enseñanza de profesores de secundaria en formación medidos cuantitativa y cualitativamente con el fin de constatar hasta qué punto los resultados coinciden. Asimismo, se compararon los cambios en concepciones y enfoques hacia una orientación centrada en el docente o en el estudiante al finalizar un programa de formación pedagógica. *Método:* 25 participantes rellenaron una escala sobre enfoques de enseñanza y contestaron preguntas abiertas en cuanto a su concepción de la enseñanza al inicio y final del programa. *Resultados y conclusiones:* Inconsistencias en los resultados sugieren que la investigación sobre enseñanza y aprendizaje, particularmente aquella sobre concepciones y enfoques, debe emplear una combinación de técnicas para asegurar que los fenómenos se examinan con precisión.

*Palabras clave:* enseñanza; enfoques educativos; formación de docentes; investigación cualitativa.

## Introduction

### Teaching conceptions and approaches

During the 1990s a number of studies (e.g., Prosser, Trigwell, & Taylor, 1994; Samuelowicz & Bain, 1992) focused on analysing teachers' conceptions on teaching following qualitative procedures. Most studies developed similar categorisations of teaching orientations/conceptions, which Kember (1997) grouped into qualitatively different categories: a teacher-centred/content-oriented category (further divided into A. Imparting information; B. Transmitting structured knowledge); an intermediary category (C. Student-Teacher interaction/Apprenticeship); and a student-centred/learning-oriented category (divided into D. Facilitating understanding; D. Conceptualising change/Intellectual development). There has been debate in the literature as to whether teaching orientations are hierarchical sets of categories or separate, discrete entities (Kember, 1997). Some authors (e.g., Prosser et al., 1994) agreed on considering teaching conceptions within a hierarchy, where lower categories are present in upper ones. Other studies (e.g., Samuelowicz & Bain, 1992), however, did not find evidence of such a hierarchy and claimed that orientations are differentiated and independent categories.

Research inspired by the students' approaches to learning (SAL) tradition initiated some decades ago (Ramsden, 1992; Trigwell & Prosser, 1996) and still thoroughly investigated in Spain (e.g., Olmedo, 2013; Romero et al., 2013) identified main two teaching approaches: 1) a conceptual change and student-focused (CCSF) approach; and 2) an information transmission and teacher-focused (ITTF) approach (Prosser & Trigwell, 2014; Trigwell & Prosser, 1996).

There is evidence (Kember & Kwan, 2000; Trigwell & Prosser, 1996) of a link between teaching conceptions and approaches. Those teachers who conceptualise teaching as transmission of facts tend to adopt a teacher-focused approach to teaching. Similarly, teachers who see teaching as a means to help their students grow are more likely to adopt a student-centred approach (Trigwell & Prosser, 1996). For Kember and Kwan (2000, p. 486), "it seems reasonable to assume a direction of causality in the

relationship ... , lecturers who perceive teaching primarily as a process of transmitting bodies of knowledge tended to adopt a content-centred approach to teaching ...”.

The study of teaching conceptions and approaches is of paramount importance, as how teachers approach teaching is related to students’ approaches to learning (Gow & Kember, 1993; Rosário et al., 2013; Trigwell, Prosser, & Waterhouse, 1999). Thus, a student-focused approach to teaching is related to a non-surface (deep) approach to learning, while a teacher-focused approach is associated with a surface approach. This association may consequently influence the quality of learning results, as it has been confirmed that students’ approaches to learning are related to learning outcomes (Marton & Säljö, 1984; Prosser et al., 1994). Learning is thus the product of various agents, as “both teacher and student are jointly responsible for the outcome” (Biggs, Kember, & Leung, 2001, p. 137).

### **Quantitative and qualitative research**

Educational research has traditionally focused on quantitative methods because of their potential for collecting numeric data from large numbers of individuals using instruments with preset questions and responses. Instruments, however, may be susceptible to two sources of error: response set (when participants select the same answer for all items, or respond in a way that is socially acceptable or desirable), and faking (when participants give inaccurate responses deliberately; McMillan, 2012).

Alternatively, a research problem may be addressed using qualitative research, in which a phenomenon is explored, data for descriptions and topics are analysed, and the meaning of findings is interpreted (Creswell, 2012).

Finally, mixed-method designs “provide more a thorough understanding of a research problem because of the opportunity to examine multiple forms of data that are more comprehensive than data that might be collected via either quantitative or qualitative methods alone” (McMillan, 2012, p. 318). Different sources of information can be combined to address the same questions, thus triangulation will occur.

The combination of quantitative and qualitative methods has been used in educational research, particularly in the study of the phenomenon of learning (e.g., Marton & Säljö, 1984). Despite the fact that most studies on learning have a phenomenographical background, educational research on teaching has traditionally focused on quantitative methods (Trigwell & Prosser, 2004) and there are few studies with a mixed-method approach (see Postareff, Katajavuori, Lindblom-Ylänne, & Trigwell, 2008), which would help validate quantitative and qualitative results and shed light on survey-based responses.

This study examined preservice teachers’ conceptions of and approaches to teaching collected via quantitative and qualitative measures in order to find out whether results converged. Moreover, teaching approaches and conceptions after the programme were analysed to identify any positive changes which might be due to the intervention. This study would show whether qualitative and quantitative data support each other, and highlight the importance of introducing both types of research methodologies in order to shed light on an educational phenomenon, and thus address a research problem more accurately.

## Method

### Design

A convergent concurrent mixed-method design was implemented, as quantitative and qualitative were simultaneously collected and compared in order to understand a research problem (Creswell, 2012). For the analysis of the quantitative dataset a pre-experimental pretest-posttest design was used. The dependent variable was participants' approaches to teaching measured by means of two scales (CCSF and ITTF). As to qualitative analysis, an exploratory approach was used.

### Participants

This study analysed the responses of 25 preservice teachers (16 females, 9 males; mean age 27), who were chosen following convenience non-probability sampling (see Procedure for details). There was no control group.

### Data collection

Data were collected both at the beginning and end of an initial teacher training programme. Participants completed a self-report inventory, S-ATI-20 (see Monroy, González-Geraldo, & Hernández-Pina, 2015), which is a recent proposal for a Spanish version of Trigwell and Prosser's (2004) *Approaches to Teaching Inventory*. Both S-ATI-20 and original ATI measure participants' student-centred approach to teaching (CCSF) and teacher-centred approach (ITTF). This version is made up of 20 items, the half of which measure respondents' ITTF approach and the other half participants' CCSF approach. Items were rated on a five-point Likert scale (from "Strongly agree" to "Strongly disagree"), and participants scored on both ITTF and CCSF. Scale reliability of S-ATI-20 in this investigation was .747 (CCSF) and .601 (ITTF).

Additionally, and similar to previous studies (e.g., Virtanen & Lindblom-Ylänne, 2010), two open-ended questions were added at the beginning of inventory to elicit participants' opinions of what teaching was (*In your opinion, what is teaching?*) and how they described good teaching (*In your opinion, how would you describe "good teaching"?*). In this paper only the first question was analysed.

### Procedure and data analysis

The data collection procedure varied slightly at pretest and posttest. After obtaining permission from educational authorities, the authors took pretest measures from 291 students present in class at given scheduled teaching hours (academic year 2013-2014). Administration time was 15 minutes. At posttest an online survey was set up and emailed to all students enrolled in the programme (N=463), yet only 39 completed the survey (response return rate was 8.4%). Of those 39 participants, 25 had completed the survey also at pretest, and did not differ statistically from the remaining 265 in terms of age, and ITTF and CCSF mean scores.

Instructions on the aim of the study were verbally given (pretest) and displayed on screen (posttest) before collecting data so as to inform participants and ensure anonymity and confidentiality. Guidelines were also given so that participants completed the survey in a contextualised manner, that is, they had to visualise themselves teaching a course related to the field of study they were being trained for in the initial teacher training programme. In order to avoid any influence of inventory items on the open-ended questions, the latter were administered/displayed on screen before S-ATI-20.

The open-ended question specifically chosen for this study was analysed by the two authors independently and deductively using Kember's (1997) five-stage categorisation to ensure the same theoretical background and coding process were followed. A preliminary trial was conducted so as to agree on how to classify participant under this taxonomy. Then, each author separately read participants' responses thoroughly and sought to identify features of Kember's conceptions. For instance, "*Transmitting new knowledge about something I have just learnt and sharing it with others*" [Case 30-Pre] was classified as conception B, whereas "*Teaching occurs when students learn how to think for themselves and act freely and thoughtfully*" [77-Pst] was E. After coding responses independently, the authors shared their categorisation results, reviewed each case individually, and discussed discrepancies. In case of disagreement, the authors returned to the theoretical framework. Cross-checking the classification of descriptors aimed to ensure that the dataset was analysed effectively and aligned with the theory. Interrater agreement was reached in 72% of the 25 cases, and Cohen's (1988) kappa coefficients were acceptable ( $\kappa = .84$  at pretest,  $\kappa = .83$  at posttest). Once participants had been categorised, a descriptive analysis of frequencies of occurrence of the categories was done. Recoding qualitative responses into quantifiable data enabled the comparison of open-ended question data and inventory results.

When analysing the qualitative data and categorising participants under one or another conception, the authors decided to take each participant's response as a whole and neglect the position or order of statements. Some authors (e.g., Harris, 2011) suggested that the most significant elements are found in an answer's beginning, yet in this study the authors decided not to follow this, as many participants mentioned the most complex ideas at their beginning of their discourse while others started with the most basic conceptions. As teaching conceptions and approaches may be hierarchical in nature, it was in the authors' interest not to discard any valuable piece of information. Future studies may wish to follow Harris's (2011) suggestion about taking those elements placed at the beginning of an answer.

Questionnaire data were analysed descriptively with statistical package *SPSS 17*. An alpha level of .05 was used for all statistical analyses. Significant differences between CCSF and ITTF approaches were examined using a paired-sample Wilcoxon signed-rank test. Additionally, pretest-posttest changes in approaches and conceptions were analysed. In the case of teaching conceptions (qualitative data), each case was examined individually so that the authors could note down whether teaching conceptions had "improved" from A to E, "got worse" (i.e. changed from E to A), or "remained the same" (i.e. same conception at pretest and posttest). In order to discriminate between participants who had experienced a small change or a more dramatic one, the authors singled out participants whose conception had changed "more than one level" from

those who had changed “one level” or had not changed at all. Table 1 exemplifies the criteria followed to determine the degree of change, which would later allow quantifying how many participants had changed after the intervention, and comparing quantitative and qualitative data.

Table 1

*Changes in teaching conceptions*

	Types of change	Examples
--	Worsening by more than 1 level	C to A; D to B; D to A; etc.
-	Worsening by only 1 level	B to A; C to B; D to C; etc.
=	No change	Same conception at pretest and posttest
+	Improvement by only 1 level	A to B; B to C; C to D; etc.
++	Improvement by more than 1 level	A to C; A to D; A to E; etc.

A paired-sample Wilcoxon signed-rank test was used in order to identify any changes in teaching approaches (quantitative data) after the intervention. Furthermore, the authors adapted a procedure previously used by Lindblom-Ylänne, Trigwell, Nevgi, and Ashwin (2006) and Monroy, Hernández Pina, and Martínez Clares (2014) that set a *change variable* that would allow to determine the shift/change in approach scores for individual participants when comparing pretest-posttest results. Five categories were developed which show the magnitude and direction of change (Table 2). This procedure allowed quantifying the number of participants who had turned more teacher- or student-focused at posttest.

Table 2

*Change variable category of questionnaire scales*

	Direction of change	Explanation	Difference between same scale scores (posttest-pretest)
-	Strong negative change	CCSF posttest score clearly lower than at pretest	-1 or lower
-		ITTF posttest score clearly higher than at pretest	+1 or greater
-	Negative change	CCSF posttest score lower than at pretest	From -0.5 up to -1.0
-		ITTF posttest score higher than at pretest	From +0.5 up to +1.0

=	No change or minor change	Pretest and posttest CCSF and ITTF scores are equal or similar	Between -0.5 and +0.5
+	Positive change	CCSF posttest score higher than at pretest	From +0.5 up to +1.0
		ITTF posttest score lower than at pretest	From -0.5 up to -1.0
+	Strong positive change	CCSF posttest score clearly higher than at pretest	+1 or greater
		ITTF posttest score clearly lower than at pretest	-1 or lower

Finally, pretest-posttest changes in approaches and conceptions were compared in an attempt to see if they supported one another. Additionally, the authors were interested in analysing whether approaches and conceptions had become more student-centred, which would support the literature that suggests that teacher training programmes may improve teachers' views on teaching.

## Results

The qualitative and quantitative datasets were analysed separately and then compared in order to see if they yielded similar of results. Furthermore, any posttest-pretest changes in teaching conceptions and approaches were analysed. Findings are presented following this order.

### Qualitative data

The analysis of the qualitative data involved considering all components of participants' responses regardless of their position. By doing so it was possible to evidence the argument that less complex conceptions may be embedded in more complex ones, exemplified by the following case where there are elements of a B and C conception: *"From my point of view teaching at a basic level would be transmission of facts to students. However, in order for that transmission to be effective and successful, the teacher should strongly motivate students [...] and cater for students' needs"* [187-Pst].

The analysis of pretest results following the classification criteria in Table 2 showed that 48% of participants claimed that to them teaching was "transmitting structured knowledge" (conception B). Case 60-Pre illustrates this category: *"Teaching is the process by which a person transmits information, knowledge and values to another person"*.

Conceptions C and D were identified by 20% and 24% of participants respectively: Conception C: *"Teaching is arousing an interest among students and making learning an enjoyable experience for both the teacher and the student"* [107-Pre]. Conception D: *"Teaching is transmitting what I know as well as arousing curiosity and questioning among my students in order to foster debate and critical thinking"* [187-Pre].

While there were no participants with an A conception, which may be considered the “least desirable category”, only two participants (8%) showed the most “developed” one (E): *“Teaching is linked to educating. It is making people active and competent in their field of knowledge and in their personal life”* [119-Pre].

When analysing participants’ responses in detail, the words most often mentioned were “to transmit” and “transmission”. Although in most cases “transmission” referred to “contents” (information, concepts, knowledge [case 76-Pre, 212-Pre, and 283-Pre, respectively]), other examples revealed a desire to go beyond: *“Transmitting knowledge, and moral and personal values”* [99-Pre]. Some participants linked the word “transmission” to “practicality”, thus showing an interest in making the taught content (i.e. transmitted content) useful to others: *“Transmitting useful knowledge to others”* [283-Pre].

At posttest 48% of participants showed a C conception: *“Teaching is when you transmit facts so that other people may internalise them and use them as often as they need to”* [210-Pst]. The “simplest” conceptions (A and B) were reported by 8% and 12% of participants respectively, while 16% and 16% were described as having the two most “developed” ones, namely conception D (*“Teaching is not only transmitting literature contents, for instance, but also getting students to learn to think critically, express themselves adequately... In sum, making them individuals capable of coping with everyday problems.”* [11-Pst]); and conception E (*“What is teaching? That’s a difficult question. Teaching is giving students access to materials so that they are capable of learning autonomously; it is educating people; it is guiding them towards a self-discovery of their own critical thinking; it is strengthening a sense of curiosity for everything that surrounds us; it is encouraging students to question everything they’ve learnt”* [95-Pst]).

### Quantitative data

The analysis of the pretest dataset collected with S-ATI-20 showed that CCSF scores ranged from 3.2 to 4.7, while ITTF ranged from 2.0 to 3.8, and mean scores were 4.1 and 2.9 respectively. A Wilcoxon signed-rank test for related samples revealed a statistically significant difference between both approaches at pretest ( $z = -4.38$ ,  $p < .001$ ) with a large effect size ( $r = .63$ ) following Cohen’s (1988) guidelines.

Before implementation of the programme, 100% of participants scored higher on CCSF than on ITTF, however, this gives us little information as participants may score highly on both approaches yet with only a very small score difference. When looking into individual cases, the differences between CCSF and ITTF mean scores ranged from 0.1 to 2.7. The case with the smallest CCSF-ITTF mean score difference (0.1) scored 3.2 on CCSF and 3.1 on ITTF and was qualitatively categorised as B conception [283-Pre], while the one with the largest CCSF-ITTF mean score difference (2.7) scored 4.7 (CCSF) and 2.0 (ITTF) and was qualitatively described as C conception [77-Pre].

The analysis of the posttest data showed that CCSF scores ranged from 3.3 to 5.0, while ITTF from 2.3 to 3.8, and mean scores were 4.3 and 2.9 respectively. A Wilcoxon signed-rank test for related samples showed that there were statistically significant differences between both approaches and the effect size was large ( $z = -4.37$ ,  $p < .001$ ,  $r = .63$ ). Once again, 100% of participants scored higher on CCSF. When looking into



individual cases, the differences between CCSF-ITTF mean score differences ranged from 0.2 (case 9-Pst, qualitatively categorised as B) to 2.7 (case 60-Pst and 95-Pst, both also qualitatively categorised as B).

### Changes in teaching conceptions and approaches

When analysing pretest-posttest changes, a comparison of percentages of participants under each qualitative category at both moments was not appropriate, as figures did not reveal which participants had indeed become more student-focused upon completion of the training course. That is, the statement that 52% of participants had a teaching conception C or above at pretest while 80% had it at posttest (which would be a positive change) may be misleading because some participants may have in fact regressed to lower categories at posttest. The authors thus introduced some criteria to keep track of changes in teaching conceptions (Table 1) and approaches (Table 2). These criteria would later allow a comparison of results, yet without neglecting that two related, but not equal, constructs (conceptions and approaches) were under examination.

The analysis of changes in teaching conceptions (left column, Table 3) following the classification criteria in Table 1 showed that in 40% of cases conceptions had “improved” (i.e. turned more student-focused), while 32% had “got worse” (more teacher-focused). Following the “change variable” procedure in Table 2, it was possible to identify the number of participants whose approaches had become more or less student- or teacher-focused after the programme (Table 3). Thus, 36% of participants scored higher on CCSF and 32% scored lower on ITTF at posttest (i.e. approaches improved at posttest). In contrast, 12% scored lower on CCSF and 36% scored higher on ITTF at posttest, that is, their approaches had got worse.

Table 3

*Cases in terms of type of analysis*

	Qualitative			Quantitative CCSF			Quantitative ITTF		
	f	%	Accum%	f	%	Accum %	f	%	Accum %
--	3	12	32	0	0	12	3	12	36
-	5	20		3	12		6	24	
=	7	28		13	52		8	32	
+	4	16	40	6	24	36	5	20	32
++	6	24		3	12		3	12	

Furthermore, a paired-sample Wilcoxon signed-rank test was used to compare pretest-posttest differences in approaches. Despite an increase in CCSF mean scores (from 4.1 at pretest to 4.3 at posttest), this difference was not statistically significant ( $z = -1.23$ ,  $p = .22$ ), and the effect size was small ( $r = .18$ ). As to ITTF mean scores, there was a slight increase (from 2.93 at pretest to 2.94 at posttest), but it was not statistically significant ( $z = -0.072$ ,  $p = .943$ ) and the effect size was small ( $r = 0.01$ ).

## Discussion

This study focused on the analysis of teaching conceptions and approaches measured qualitative and quantitative respectively in order to identify convergence of results. Moreover, any changes in conceptions and approaches towards a student-centred or teacher-centred orientation upon completion of a training course were compared.

The quantitative analysis shows significantly higher CCSF mean values at pretest and posttest. At first, these figures are positive indicators in that participants, who may soon start a teaching career, would approach their teaching placing the student at the centre of the teaching-learning process. These findings, however, contrast markedly with the high percentage of participants who are identified reporting teacher-centred conceptions (A and B). When focusing on individual cases, the inconsistency between participants' scores and qualitative responses is evident. For instance, Case 9-Pre scores 4.2 on CCSF and 2.4 on ITTF at pretest, which is clearly a student-focused orientation, yet is categorised as B. Case 77-Pre also shows a student-focused approach (4.7 on CCSF, 2.0 on ITTF) at pretest, but is classified as conception C. Other cases are more extreme, such as Case 22-Pst with an A conception at posttest but a score of 4.0 on CCSF and 3.3 on ITTF.

The fact that the same individual may be classified under opposite categories depending on the construct and measurement instrument should lead to reflection. One possible explanation to such inconsistent results may lie in that participants effectively identify or predict right/wrong items in a questionnaire and fake responses, or lose interest when completing it, whereas they may control their responses to open-ended questions less successfully and thus express their genuine opinion. On the other hand, the validity and reliability of S-ATI-20 (see Data collection section) should ensure that approaches to teaching are accurately measured, so the question remains: How is it possible that an individual conveys such contradictory and opposing views on teaching? Which set of responses should be given credit? Future research ought to focus on fine-tuning instruments and procedures in order to accurately measure phenomena.

As to the pretest-posttest transformation of conceptions, at first glance there is shift from B (transmission) to C (application of knowledge, student-teacher interaction) from 20% at pretest and 48% at posttest. This positive change may be due to the "professionalising nature" of the programme and the emphasis placed on the application of practical knowledge. Very likely, most participants would apply for a teaching post after completing the course, so the programme is clearly application-oriented. Furthermore, more participants report an E conception at posttest (from 8% to 16%), which is a positive finding. In contrast, 8% seem to hold an A conception at posttest, while not a single participant is categorised as such at pretest. This regression to lower categories should be regarded as a worrying outcome, as it implies that after undertaking teacher training, some individuals conceptualise teaching as simply imparting contents. Alternatively, a reason for this finding may lie in that some participants use terminology interchangeably (impart, transmit, convey, deliver) without knowing their true pedagogical meaning, or simply that they recall their favorite teachers' discourse without really grasping its core meaning. Any programme aiming at improving some educational aspect in individuals, such as the teacher training programme under study, should focus on modifying underlying beliefs or conceptions, not simply on teaching approaches (Kember, 1997).

When contrasting percentages, these should be analysed with caution, as pointed out earlier because this simple procedure neglects the fact that some participants appear under one category when measured quantitatively and under another (often opposite) when measured qualitatively, which in the end leads to a levelling out of figures. This is why the authors introduced the criteria in Table 1 and 2 when comparing pretest-posttest changes both in conceptions and approaches. The results point at an apparent improvement in conceptions at posttest, as 40% of cases became more student-focused when data are measured qualitatively, and 36% when measuring CCSF quantitatively (Table 3). These results support previous studies (e.g., Postareff, Lindblom-Ylänne, & Nevgi, 2007) that claim that teacher training fosters a student-centred approach among participants.

The fact that the conceptions of 40% of participants became more student-focused by the end of the programme is a positive result, yet not so that almost one third turned more teacher-focused and the other third did not modify their conceptions (left column, Table 3). Some possible explanations may be: a) the insufficient length of the intervention (one academic year) despite recommendations from some authors such as Postareff et al. (2007); b) the fact that this particular training programme is a prerequisite for all those who wish to become a secondary teacher in Spain; many students enrol in this course in order to enhance their curriculum vitae in periods of economic crisis (Monroy et al., 2014), which in fact contrasts sharply with the intrinsic motivation of these would-be teachers found by Serrano and Pontes (2015); c) the fact that after the programme participants are aware of their weaknesses and inexperience, as well as the intrinsic difficulties in teaching, which may lead to a desire to keep some aspects under control such as what contents they teach, how they teach them, how they organise materials, etc. In sum, the findings from the qualitative analysis suggest that the initial teacher training programme did not yield the expected positive effect on participants, namely becoming more student-focused. Nevertheless, the nature of this type of research is exploratory, thus no generalisation of results are feasible.

Conceptions and approaches are closely related (Kember & Kwan, 2000), and the latter are strongly determined by the former, which are in turn quite stable and deeply rooted, and are not easily changed (Kember, 1997). Kember and Kwan (2000) argued that teaching approaches are more stable than learning approaches and are thus difficult to change. In contrast, Trigwell and Prosser (1996) suggested that teaching approaches are dynamic and relational, and Kember (1997, p. 270) claimed that “there will not always be an automatic relationship between underlying beliefs and observable teaching approaches. Those holding student-centred conceptions of teaching may at times still have to employ approaches which appear inconsistent with that belief” if forced by circumstances. In the case of our sample (preservice teachers), as they are not yet practicing professionals no apparent factors would be influencing their approaches, which should in principle reflect their underlying teaching conception. It may be speculated that the pedagogical programme (or other factors) may have an impact on participants’ approaches to teaching, yet it is less likely that their conceptions may have been affected after such a short period of time.

The incongruence between quantitative and qualitative results at pretest and posttest are also present when analysing any changes in conceptions and approaches after the intervention. Such is the case of participant 198, who shows a quantitatively moderate

positive change ( $>0.5$ ) both on CCSF (+0.6) and ITTF (-0.6), yet experiences a two-level regression from E to C when analysed qualitatively. Similarly, case 77 shows a positive tendency towards a student-centred conception (from C to E) at posttest, yet her CCSF score decreases (0.7) and ITTF score markedly increases (1.1). In an attempt to make sense of these contradictory results, the cases in which the change towards a teacher- or student-centred view was consistent in both the quantitative and qualitative results were identified. Only 8 out of the 25 participants showed convergent results, that is, the quantitative results support the qualitative findings, while in the remaining 17 cases conceptions change in one direction while at least one of the approach scales changes in the opposite direction, which is an indication that a single method may not measure conceptions/approaches reliably. Such disparate results reveal the discrepancy that may result when examining a phenomenon such as teaching using different methodologies.

This study raised more questions than answers, such as how bad a high ITTF score or a strong B conception may be. The fact that some participants display a teacher-focused conception to teaching by the end of the programme may not necessarily be a negative result. Although student-centred teaching may seem the ideal scenario, transmission of knowledge ought not to be regarded as an ineffective approach or set aside (González Geraldo, B. del Rincón Igea, & D.A. del Rincón Igea, 2011). Nevertheless, teacher with more developed viewpoint, and thus more sophisticated theories, would be more adaptive to different contexts and circumstances.

### Conclusions and limitations

In this study special care was taken when collecting and analysing data in order to control or minimise possible sources of error. In order to reduce any effects of single questionnaire items on the response to the open-ended questions, the latter were always displayed first. Nevertheless, some limitations may have affected the results of this study. For instance, the open-ended questions did not allow gathering as much qualitative data as other instruments, so future studies should increase the qualitative dataset by conducting interviews. Also, the combination of research designs implemented in this study (exploratory and pre-experimental), as well as the small sample, do not allow generalising results as to whether the programme had an impact on conceptions/approaches. Future studies should aim at overcoming these limitations or analyse larger samples.

This study aimed at gaining an insight into participants' teaching conceptions and approaches. It highlights the importance of conducting both quantitative and qualitative research to get a fuller picture of a phenomenon and address a research problem more effectively. The results reveal that there may be inconsistency in the quantitative and qualitative responses on teaching. If inventories are adequately validated, open-ended questions should in principle lead to similar, compatible results. The incongruence found suggests that: a) S-ATI-20 requires further revisions; b) researchers should not rely solely on quantitative measures; c) a combination of methods is always desirable when analysing educational phenomena. Researchers should not naturally assume that a single instrument is capable of measuring teachers' teaching approaches, or that an instrument validated in one context should automatically work in another (Monroy et

al., 2015). The use of mixed methods should provide a better understanding of teaching as it combines the best of either method.

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