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Foundations of Teaching and Learning – A Study with Teachers on Conceptions and Pedagogical Practices

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This article aims to investigate the relationships between teachers' conceptions of teaching and learning and their practices, and the impact that a set of sociodemographic variables has on those conceptions and practices. For this purpose, an online questionnaire, specifically elaborated for the study was applied to 562 teachers from primary to secondary education. Pearson's R correlation coefficient was used to analyse the relationship between teachers' conceptions and practices. The Student's T-test and ANOVA were used to compare the average score of conceptions and practices according to gender, years of service, education, scientific teaching area, and education level. The binary logistic regression was performed to analyse the association between the teachers' conception and practice and the sociodemographic variables. Results show that comprehensive and collaborative conceptions are positively related to inclusive practices and systematic and conventional conceptions are positively related to conservative practices. Women had a higher score than men on comprehensive and collaborative conceptions, inclusive practices and conservative practices. Teachers with more experience had higher systematic and conventional conceptions than those with up to 25 years of service. Those from the scientific area of special education and primary education presented scores of comprehensive and collaborative conceptions, inclusive practices and conservative practices significantly higher than the teachers of the remaining scientific areas. The lower the education level where teachers teach, the higher the score in the dimensions related to conceptions and practices.

Keywords: teaching, learning, teacher's conceptions, pedagogical practices, teacher training

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INTRODUCTION

The role of teachers is important in students' learning. Their teaching and learning conceptions impact the planning and implementation of pedagogical practices. Teachers have differences in the way they understand themselves as professionals. This is reflected in the conceptions and practices of teaching and learning, which materialise in how they organize daily activities and how they understand students' assessments. Teacher involvement in class management is an important factor in achieving success in education (Maisaroh, Endahati, & Andrian, 2023). Class effectiveness depends on how involved the teachers are in directing and dealing with the pedagogical daily routines (Franklin & Harrington, 2019). The Portuguese new legislation for education highlights, on the one hand, educational planning student-centred, according to their needs, potentialities and interests through a multilevel approach and, on the other hand, the flexible management of the curriculum, to respond to the singularities of each student. These assumptions imply effective changes in teachers' practices since teaching and being a teacher entails continuous personal/professional growth and development (Davis, Sumara & Luce-Kapler, 2008; Dejene, 2020).

The entire system needs to ensure effective teacher training (Danielson, 2007; Hattie, 2003; Marzano, 2003). Several studies have quantified the teacher's influence on the student's academic performance. Substantial research allows us to conclude that not all educational practices are equal, meaning that different pedagogical practices have a distinct impact on learning (Hanushek, 2002; Hattie, 2009; Taylor et al., 2010). However, there is still scarce evidence about the impact of sociodemographic variables (e.g., years of service, level of education, scientific teaching area, among others) on teachers' conceptions of teaching and learning and their practices. Our study was developed according to this sense, trying to relate teachers' conceptions of teaching and learning with their practices. The purpose is to contribute to the professional development of teachers, investing decisively in continuous training, namely through the reinforcement of knowledge based on empirical pieces of evidence. Valuing teachers' teaching and learning conceptions in professional development training activities is fundamental to changing the school (Ambrosetti, 2015).

Mardiha and Alibakhshi (2020) highlighted that teachers' conceptions play an important role in classroom decisions and teaching approaches. The recognition of the professional beliefs of teachers helps us to predict their conduct and behaviours in the classroom and the teaching-learning process (Luján, 2021). Furthermore, teachers' conceptions influence their pedagogical practices, namely, the planning, the teaching method, the implementation of learning activities and the assessment criteria (Fives & Buehl, 2012; Levitt, 2001; Mellado, 1998). These studies provided the core ideas for the development of our questionnaire, which comprises a first part of the questionnaire dedicated to conceptions about what teaching is, what learning is and what evaluation is, and a second part focused on attitudes and judgments on pedagogical practices, specifically on teaching and learning planning and classroom organization.

The consistency of the relationship between teachers' conceptions of teaching and learning and their practices was found over the years in different academic subjects;

mathematics (Vacc & Bright, 1999), science (Czerniak & Lumpe, 1996), history (Wilson & Wineburg, 1988) and literacy (Fang, 1996). However, some studies state the opposite, highlighting that teachers' conceptions of teaching and learning and their practices do not always have a consistent relationship (Ertmer, Gopalakrishnan & Ross, 2001; Farrell & Lim, 2005).

In the last twenty years, research on conceptions of teaching and learning and their relationship with practices adopted in the classroom has focused on different topics, including the role of teachers and students in teaching (Mahmood, 2007); the degree of student participation in the classroom (Ashiq, Azeem & Shakoor, 2011; Lombardi et al., 2022); classroom's organization (Holf-Reynolds, 2000); the teaching objectives (Shumba, 2011); the evaluation criteria (Savasci, 2006); research and projects for the development of learning (Roehrig & Luff, 2004). The teacher's role is essential for developing teaching and learning practices that allow the student to acquire knowledge, understand it, apply it, and generalize it to everyday situations (Echazarra et al., 2016). Learning should train the learners to act autonomously and actively in the learning process (Winarti, Ambaryani, & Putranta, 2022). Teachers who aim to stimulate deep learning focus on actively constructing knowledge, pointing out permanent conceptual changes in their students (Jacobs et al., 2016). Learning will be meaningful if it allows conceptual development and individual understanding, key aspects for students to engage in a deep learning approach and more complex learning concepts (Entwistle, 2000).

Fenstermacher and Soltis (2004) claimed that teachers are conceptually divided into three approaches to teaching: executive, facilitator and liberationist. The executive approach reveals a teacher as a skilful manager of learning, focusing on acquiring students' knowledge, skills and competencies. The facilitator approach refers to teachers who focus on developing each student's unique abilities and personal characteristics to help them achieve authenticity and self-fulfilment. The liberationist approach sees the teacher as a liberator of the mind, emphasizing the development of the student's intellectual and moral virtues. Onwuegbuzie et al. (2007) suggested the existence of two types of approaches to teaching, namely, a transmissive approach and a progressive approach. The transmissive (teacher-centred) approach emphasizes the transmission of knowledge to students and uses the lecture as a priority teaching method. The progressive approach (student-centred) highlights the relationship of teaching and learning with the world of people and materials, inside and outside the school environment, valuing the construction of humanist values.

The main differences between teacher-centred and student-centred/learning approaches are manifested, mainly in the setting of the goals, in teacher's role, the type of assessment applied and the interaction between student and learning content (Pedersen & Liu, 2003). In a teacher-centred approach, students work to meet the goals set by the teacher; the teacher assumes a directive role; controls student interaction; uses grades to motivate students, and the grades determine the final scores. In a student-centred/learning approach, students play an active role in their learning; the teacher plays a facilitator role to help students take control of their learning; students interact with peers and learn collectively on diverse tasks; intrinsic motivation is a key factor;

and the focus of assessments is on understanding students' learning needs (Singhal, 2017; Wright, 2011).

The current demands of being a teacher make it essential that the teacher conceives him/herself as a professional in constant learning and development and as a lifelong learner considers his/her success related to the level of success achieved by the students. Lifelong learning requires the teacher to become a learner of their teaching by engaging in meaningful practice (Hattie, 2009). This practice will allow the teachers to continuously thoughtful activity in their teaching (Schön, 1983), leading to awareness of their practice and improving their ability to learn and teach. Davis et al. (2008) mention "teaching is an enormously complex undertaking that is learned over a lifetime" (p.192), highlighting that teaching and being a teacher implies continuous personal/professional growth and development.

Based on previous evidence, the role of teachers is crucial in students' learning and their teaching and learning conceptions have an impact on the planning and implementation of pedagogical practices, but evidence about their relationship is still scarce. Therefore, the two-fold goals of the present study are: to investigate the relationships between teachers' conceptions of teaching and learning and their practices, and the impact that a set of sociodemographic variables has on those conceptions and practices.

METHOD

Participants

The sample consisted of 562 participants, 469 (83.5) were women, and 93 (16.5) were men. The age distribution reveals 127 (22.6%) participants up to 45 years of age; 219 (39%) between 45 – 55 years old; and 216 (38.4%) were over 55 years old. Regarding years of service, 74 (13.2%) participants had up to 15 years of service; 188 (33.4%) had between 15 and 25 years of service, and 300 (53.4) had more than 25 years of service. In terms of academic qualifications, 393 (69.9%) participants had a Bachelor's degree; 147 (26.2%) had a Master's degree; 22 (3.9%) had a PhD. Concerning the education level, 139 (24.7%) participants taught in primary school; 109 (19.4%) in middle school; 169 (30.1%) in high school; and 145 (25.8%) in secondary school. Finally, regarding the scientific teaching area, 202 (35.9%) humanities; 87 (15.5%) sciences; 66 (11.8%) arts and expressions; 112 (19.9%) primary education; 55 (9.8%) special education; 40 (7.1%) participants marked "other".

Research tool

The questionnaire on conceptions of teaching and learning and pedagogical practices (QEADP) was built with the aim of understanding/verifying whether teachers' conceptions of teaching and learning influence the planning and implementation of their pedagogical practices (Ferreira, 2022). The items were thought of from previous studies, namely interviews with teachers where they were encouraged to report and reflect on their conceptions of teaching and learning and their pedagogical practices (Ferreira & Reis-Jorge, 2022; Ferreira et al., 2020; Reis-Jorge et al., 2021).To this end, 22 items were generated in a questionnaire whose responses are Likert-type with 5-

point intervals, ranging from 1 (total disagreement) to 5 (total agreement). The QEADP items describe, in the first part, conceptions about what teaching is (e.g. item 2. Providing opportunities for active discussion and cooperative work among students; or item 3. Instructing, testing and classifying students' learning); what learning is (e.g. item 7. The ability to build knowledge through mutual questioning and collaboration with peers; or item 8. To know how to use concepts, principles and techniques in activities that take place in the classroom) and what is to evaluate (e.g. item 12. To provide feedback to students to offer clear and objective guidance on improving learning and academic performance; or item 13. To test students through periodic tests and final exams, to judge students' acquired knowledge and decide on their progression). The second part describes attitudes and judgments on pedagogical practices, specifically on the planning/organization of teaching and learning (e.g. item 17. Learning activities must be equal and simultaneous for all students; or item 21. The physical environment of the classroom must be changed regularly to allow students to change groups, allocating different time and resources to each group) (Ferreira, 2022).

The content validity was confirmed by experts who rated each item, considering its relevance, clarity, simplicity and ambiguity. Among the ten experts selected for their academic, research and practical skills, the indices obtained were higher than .78, with moderate to strong agreements (.40≥k≤ .70). Reliability was analysed through internal consistency (Cronbach's α=.85) and temporal stability with Pearson's correlations, using the test-retest technique, obtaining values between .45 and .94. Factor analysis has shown four factors/dimensions with theoretical and empirical relevance that explain 54.4% of the total variance: Dimension 1 - Comprehensive and collaborative conceptions (Ccc1) - items associated with a constructivist perspective and less directive teaching-learning conceptions; Dimension 2 - Systematic and conventional conceptions (Scc2) - items associated with more traditional and directive teaching-learning conceptions; Dimension 3 – Inclusive practices (Ip3) - items associated with student/learning-centred approaches; Dimension 4 – Conservative practices (Cp4) - items associated with teacher-centred approaches. (Ferreira, 2022)

The ethical requirements inherent to an investigation of this nature were guaranteed. They were included on the first page of the instrument, explaining the purpose and procedures, ensuring the confidentiality and anonymity of the data. All participants explicitly agreed to participate in the study voluntarily and gave their informed consent before answering the questionnaire. The questionnaire was sent randomly to several schools and we used the LimeSurvey software to apply the questionnaires.

Data analysis

We analysed the reliability of the QEADP through internal consistency, using Cronbach's α (.85). Descriptive statistics for the total sample were calculated for all variables (means, standard deviation, and percentages). Pearson's R correlation coefficient was used to analyse the relationship between teachers' conceptions and practices. The Student's T-test and ANOVA were used to compare the average score of conceptions and practices according to gender, years of service, education, scientific teaching area, and education level. The median of each teacher's conception and

practice was calculated. Two groups were created using the median values for each conception and practice. With these dichotomized variables, binary logistic regression was performed to analyse the association between the teachers' conception and practice and gender, years of service, education, scientific teaching area, and education level. Data analysis was performed using Statistical Package for the Social Sciences (SPSS, v.28). Statistical significance was set at $p<0.05$.

FINDINGS

Table 1 presents the correlation between the teachers' conceptions and practices. It appears that comprehensive and collaborative conceptions (Ccc1) are positively related to inclusive practices (Ip3) ($r=0.47$, $p<0.001$) and systematic and conventional conceptions (Scc2) are positively related to conservative practices (Cp4) ($r=0.47$, $p<0.001$). The two conceptions and the teachers' practices are positively and significantly related to the total score. The correction ranged between 0.60 and 0.69.

Table 1
Correlation coefficients between teachers' conceptions and practices

	Ccc1	Scc2	Ip3	Cp4	Total
Ccc1	1.00	0.01	0.47**	0.21**	0.60**
Scc2		1.00	0.10*	0.47**	0.67**
Ip3			1.00	0.29	0.69**
Cp4				1.00	0.68**
Total					1.00

Abbreviations: (Ccc1) comprehensive and collaborative conceptions; (Scc2) systematic and conventional conceptions; (Ip3) inclusive practices; (Cp4) conservative practices
*$p<0.05$, **$p<0.001$

The relationship between the average score of each teacher's conception and practice and the gender, years of service, education, scientific teaching area, and level of education that teachers teach is presented in Table 2. Women had higher score than men on Ccc1 ($t(560)=-2.558$, $p=0.030$), Ip3 ($t(560)=-2.884$, $p=0.015$) and Cp4 ($t(560)=-2.933$, $p=0.002$). Those with more experience had higher Scc2 than those with up to 25 years of service ($F(2,561)=4.309$, $p=0.014$). Analysing the relationship between the conceptions of teaching and learning and the scientific teaching area, the special education teachers and the primary education teachers presented scores of Ccc1 ($F(4,521)=5.129$, $p<0.001$), Scc2 ($F(4,521)=4.945$, $p<0.001$), Ip3 ($F(4,521)=14.512$, $p<0.001$) and Cp4 ($F(4,521)=6.766$, $p<0.001$) significantly higher than the teachers of the remaining scientific areas. Regarding the education level, the lower the education level where teachers teach, the higher the score in conceptions and practices.

Table 2
Relationship between teachers' conceptions and practices with gender, years of service, education, scientific teaching area and education level

	Ccc1	*p*	Scc2	*p*	Ip3	*p*	Cp4	*p*
Gender		0.030		0.745		0.015		0.007
Men	34.38		15.75		36.99		10.54	
Women	(4.41)		(5.92)		(5.04)		(3.03)	
	35.45		15.95		38.36		11.39	
	(3.52)		(5.18)		(4.01)		(2.70)	
Years of service		0.999		0.014		0.053		0.406
≤ 15 years	35.28		15.45		38.28		10.95	
16-25 years	(3.02)		(5.43)		(3.48)		(3.44)	
>25 years	35.27		15.14		38.69		11.15	
	(3.71)		(5.38)		(3.99)		(2.82)	
	35.27		16.52		37.75		11.38	
	(3.85)		(5.16)		(4.49)		(2.55)	
Education		0.065		0.098		0.298		0.358
Bachelor	35.11		15.68		38.10		11.18	
Master	(3.68)		(5.30)		(4.14)		(2.72)	
PhD	35.46		16.22		38.03		11.31	
	(3.79)		(5.02)		(4.50)		(2.82)	
	36.91		18.00		39.50		12.00	
	(3.18)		(6.70)		(3.75)		(3.31)	
Scientific		<0.001		<0.001		<0.001		<0.001
teaching area	35.02		15.46		37.51		11.28	
Humanities	(3.48)		(5.09)		(4.03)		(2.53)	
Sciences	34.64		14.95		36.14		10.61	
Arts and	(4.01)		(4.85)		(4.31)		(2.58)	
expressions	34.32		15.98		38.53		10.58	
Primary	(4.02)		(4.92)		(4.32)		(2.95)	
education	36.17		16.53		39.38		11.60	
Special	(2.94)		(5.64)		(3.65)		(3.02)	
education	36.33		18.53		40.49		12.73	
	(3.54)		(5.65)		(3.31)		(2.56)	
Education level		0.003		0.035		<0.001		0.005
Primary school	36.18		16.96		39.34		11.91	
Middle school	(2.97)		(5.84)		(3.78)		(2.90)	
High school	34.48		15.92		38.47		11.28	
Secondary	(4.24)		(4.70)		(4.26)		(2.65)	
school	35.21		15.20		37.70		11.08	
	(3.48)		(5.03)		(4.22)		(2.96)	
	35.06		15.76		37.24		10.79	
	(3.99)		(5.38)		(4.34)		(2.40)	

Abbreviations: (Ccc1) comprehensive and collaborative conceptions; (Scc2) systematic and conventional conceptions; (Ip3) inclusive practices; (Cp4) conservative practices

The odds ratio of the probability of having the Ccc1, and Scc2 conception, and the Ip3 and Cp4 pedagogical practices according to gender, years of service, education, scientific teaching area, and education level are presented in Table 3. Women are 87%

more likely (OR=1.87, 95% CI: 1.10, 3.16) than men to have Ip3. Regarding the scientific teaching area, being a special education teacher, compared to humanities teachers, increases the probability of having Ccc1 (OR=3.01, 95% CI: 1.39, 6.52) and Ip3 (OR=2.91, 95% CI: 1.36, 6.24). Being a science teacher, compared to humanities teachers, is less likely to have Ip3 (OR=0.48, 95% CI: 0.27, 0.83) and Cp4 (OR=0.57, 95% CI: 0.34, 0.98).

Table 3
Binary logistic model of the relationship between teachers' conceptions and practices with gender, years of service, education, scientific teaching area and education level

	Ccc1	Scc2	Ip3	Cp4
Gender				
Men	1.00 (ref.)	1.00 (ref.)	1.00 (ref.)	1.00 (ref.)
Women	1.26 (0.76, 2.08)	1.32 (0.79, 2.20)	1.87 (1.10, 3.16)*	1.17 (0.70, 1.95)
Years of service				
≤ 15 years	1.00 (ref.)	1.00 (ref.)	1.00 (ref.)	1.00 (ref.)
16-25 years	1.13 (0.63, 2.02)	0.83 (0.46, 1.48)	0.83 (0.45, 1.50)	0.71 (0.40, 1.28)
>25 years	1.38 (0.78, 2.45)	1.75 (0.98, 3.11)	0.73 (0.41, 1.31)	0.96 (0.54, 1.70)
Education				
Bachelor	1.00 (ref.)	1.00 (ref.)	1.00 (ref.)	1.00 (ref.)
Master	1.51 (0.99, 2.29)	1.08 (0.71, 1.64)	1.42 (0.93, 2.19)	0.99 (0.65, 1.50)
PhD	1.96 (0.74, 5.19)	1.63 (0.62, 4.28)	1.44 (0.55, 3.75)	1.62 (0.61, 4.30)
Scientific teaching área				
Humanities	1.00 (ref.)	1.00 (ref.)	1.00 (ref.)	1.00 (ref.)
Sciences	0.87 (0.52, 1.46)	1.01 (0.60, 1.71)	0.48 (0.27, 0.83)*	0.57 (0.34, 0.98)*
Arts and expressions	1.03 (0.56, 1.87)	1.17 (0.63, 2.14)	1.80 (0.98, 3.31)	0.60 (0.32, 1.10)
Primary education	2.86 (0.97, 8.41)	0.74 (0.25, 2.17)	2.73 (0.95, 7.90)	0.67 (0.22, 2.01)
Special education	3.01 (1.39, 6.52)**	1.76 (0.86, 3.61)	2.91 (1.36, 6.24)**	1.97 (0.94, 4.12)
Education level				
Primary school	1.00 (ref.)	1.00 (ref.)	1.00 (ref.)	1.00 (ref.)
Middle school	1.35 (0.48, 3.81)	0.58 (0.21, 1.64)	1.65 (0.59, 4.61)	0.68 (0.23, 1.99)
High school	1.44 (0.52, 3.97)	0.37 (0.13, 1.03)	1.61 (0.59, 4.36)	0.58 (0.20, 1.65)
Secondary school	1.40 (0.49, 4.01)	0.45 (0.16, 1.30)	1.19 (0.42, 3.34)	0.38 (0.13, 1.11)

Abbreviations: (Ccc1) comprehensive and collaborative conceptions; (Scc2) systematic and conventional conceptions; (Ip3) inclusive practices; (Cp4) conservative practices
Analysis was adjusted for age.
*p<0.05, **p<0.01

DISCUSSION

The results of our study provide empirical evidence about the relationship between teachers' conceptions of teaching and learning and their pedagogical practices. Namely, Ccc1 are more associated with Ip3. In contrast, Scc2 are more associated with Cp4. Pedersen and Liu (2003) refer that constructivist and less directive teaching and learning conceptions are associated with student-centred approaches. Traditional and directive teaching and learning conceptions are more associated with teacher-centred approaches. By the way, this positive and significant relationship between conventional conceptions and conservative practices corroborates previous studies (Feixas & Euler, 2013; Gilakjani, 2012).

Research indicates that when students view their relationships with their teachers as pleasant, amicable, and adaptable, they are more engaged in the classroom (Mallik, 2023). Recent research highlights that teachers' conceptions of teaching and learning influence the planning and implementation of their pedagogical practices (Echazarra et al., 2016; Trigwell, Ellis, & Han, 2011). This supports the intrinsic and mutually exclusive relationship of our study's four (two vs two) dimensions. Cook, Cameron and Tankersley (2007) report that teachers with more inclusive and collaborative practices are more available to learn new teaching methods, use more strategies to teach all students and are more engaged in their professional development. Collaboration between educators is the key issue when implementing inclusive practices within schools (Paju et al., 2022).

Our results show that women and men reveal significant differences in three of the four dimensions, namely Ccc1, Ip3 and Cp4. Rashidi and Naderi (2012) found that female teachers were reported to be more supportive and communicative, while Wood (2012) reported that they are more informal, showing more openness toward students. Ahmed, Ambreen and Hussain (2018) reported in their study that female teachers exhibited more classroom management skills than male teachers. Female teachers spend a significant amount of time encouraging and allowing student participation, asking more questions, and using fewer directive forms (Chudgar & Sankar, 2008), while male teachers tended to dominate and exercise greater control (Wood, 2012). Male and female teachers behave differently in the classroom and students react differently to their teachers' behaviours. Mullola et al. (2012) reported that male teachers accentuated group work and structured activities compared to female teachers. Murphy et al. (2018) also found significant gender differences when assessing teaching methods, with male teachers indicating the top classroom activity in the classroom as "group activities", and female teachers indicating "volunteering to answer professor's questions."

In our study, the results also highlight that teachers with more years of service revealed significant differences compared to their colleagues in the Scc2 dimension. Several studies concentrated their efforts on the consequence of teaching experience on teachers' conceptions. Although transmission-oriented and teacher-directed practices dominated the classroom lessons of the teachers, more elements of constructivist instruction were found in the classroom lessons of the experienced teachers (Caleon, Tan, & Cho, 2018). The results of the studies are not irrefutable. Some studies don't

reveal clear differences between teaching experience and teachers' conceptions (Porlán & del Pozo, 2004; Norton et al., 2005). Other studies have shown that more experienced teachers demonstrated more complex and multifaceted conceptions (Fives & Buehl, 2010; Rubie-Davies, Flint & Mcdonald, 2012). It means that more experienced teachers hold more traditional conceptions when compared with less experienced teachers (Bautista, Pérez-Echeverría & Pozo, 2010; Tsai, 2002).

We also obtained significant differences in the four dimensions studied (conceptions and practices) between the two groups, special education teachers and primary education teachers, and teachers from other scientific teaching areas. The results of previous research argument in the same path, emphasizing that primary teachers hold more sophisticated learning and teaching conceptions than secondary teachers (Pecharromán et al., 2006; Uribe et al., 2006), and the group formed by special education teachers consists of professionals with more training and teaching experience in typical and atypical development, which helps them to become aware of the complexity of teaching and learning processes (Martin et al., 2014). Alnahdi, Lindner and Schwab (2022) emphasised in their study the importance of school-level inclusive teaching practices implemented by primary teachers and their relation to student's school experiences. Attention must also be given, that smaller classes can improve teacher-student interactions and individualized instruction and the nature of teaching in primary education require more activity-based instruction with possibly more group work (Laitsch, Nguyen, & Younghusband, 2021). On the other hand, a study by Blatchford and Russell (2019) shows that class size does not directly impact attainment but works through the many ongoing difficult decisions teachers have to make about how best to manage and teach students in groups.

Also noteworthy in our results, concerning the education level, the lower the education level where teachers teach, the higher the score in the dimensions related to conceptions and practices. Fives and Buehl (2010) and Rubie-Davies et al. (2012) found that primary education teachers compared to middle and high school teachers displayed stronger efficacy principles about classroom management and student engagement. In a relevant study, Triviño-Amigo and colleagues (2022) concluded that even though teachers believe that their initial training is insufficient and that continuous training has helped them to improve their practices, primary teachers have shown a higher predisposition to attend training courses when compared to teachers from other education levels. Also, cannot be neglected that the increased weight given to subjects in the curriculum of secondary education may be contributing to a type of teaching practice in which it is harder to apply individualized and constructivist learning principles (Martin et al., 2014).

Alger (2009) highlights that some of the factors that might explain the discrepancies mentioned above could be related to the fact that different levels of experience correlate with belonging to different generations, adding to these distinct scientific teaching areas, signifies that teachers have experienced different paradigms of teacher training. This reality can justify the differences between teachers' conceptions and practices obtained in our four-dimension model regarding the education level and the scientific teaching area. In conclusion, teachers' practices do differ between the different levels of

education and it is likely that this, in interaction with the diversity of training backgrounds, influences teachers' conceptions at each stage of schooling. Most of the evidence supports that the scientific teaching area has an impact on teachers' conceptions of teaching and learning, confirming the statement that teachers in primary education hold more complex conceptions, closer to constructivism, as they will be more inclined to focus the pedagogical practices on the development of students' capacities and not only on the transmission of the contents included in the curriculum. This assumption is sufficiently strong to rethink the type of students that we want upon leaving school and to question how we can improve teachers' 21st competencies to support the creation of 21st-century learners.

CONCLUSION

Teachers who present comprehensive and collaborative teaching and learning conceptions and inclusive pedagogical practices understand the importance of privileging "Learning by doing", dominating a more versatile and comprehensive repertoire of teaching strategies (Cook et al., 2007). A decisive commitment to teachers' continuous training becomes essential, namely through the reinforcement of knowledge based on empirical evidence that can value curricular diversity and methodologies and strategies of differentiated instruction (Ferreira, 2023).

Anyway, it is important to stress that there is no single recipe for excellent teaching and that different schools, operating in different contexts and cultures, can achieve success using different teaching and learning practices. Teachers' conceptions are conditioned by personal and contextual factors (Jacobs et al., 2014, 2016). Literature also highlights that teachers need to employ a variety of teaching strategies in the classroom such as individual learning activities, group work and whole-class instruction (Cooper, 2014; Fives & Buehl, 2012; Levitt, 2001; Megawati, Basikin & Wibawa, 2020). Whole class instruction can be a highly effective instructional approach if it includes discussion and collaborative work and learners can respond and contribute (Little, Goe & Bell, 2009; Pianta & Hamre, 2009).

There are some related limitations that we want to acknowledge. To carry out the binary logistic regression, the variables of the teachers' conceptions were dichotomized through the median value. When we reduce a continuous variable to a dichotomous nominal variable, we lose some information associated with it. However, binary logistic regression allowed us to better understand the probability of teachers having different teaching and learning conceptions.

Following our results, even though not neglecting the singularity and experience of the teachers attending the training, it could be beneficial to include in the teacher training courses explicit mentions of more collaborative and inclusive methodologies.

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