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Development and factor structure of the teaching approach scale

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Introduction: The study presents the development and validation of the Teaching Approach Scale (TAS), a tool aimed at assessing teaching approaches in educational settings. Literature emphasizes the significance of collaboration and a student-centered approach in enhancing learning environments. However, the translation of these approaches into daily practices faces challenges due to entrenched traditions and individual perspectives. The TAS addresses this gap by assessing educators' perspectives on teaching approaches.

Method: Exploratory and confirmatory factor analyses carried on a sample of 642 teachers revealed four dimensions defining learning approaches: (a) Development of students' autonomy, (b) Comparison and synergy in the teacher's group, (c) Development of the student as a person, and (d) Standardization of teaching.

Results and discussion: The TAS serves as a valuable instrument for capturing teachers' perspectives on teaching, thereby offering valuable insights for enhancing teaching practices and fostering professional development. Further studies need to face TAS validity and reliability, nevertheless, this study underscores the importance of considering teacher learning cultures in improving educational procedures, highlighting the role of individual perspectives in shaping teaching practices and learning environments.

KEYWORDS

teacher approach, student-centered approach, collaborative learning, factor structure, exploratory factor analysis (EFA), confirmatory factor analysis (CFA)

1 Introduction

Educational psychology, alongside pedagogy, has traditionally been dedicated to the study of educational contexts to promote students learning and support teachers through new insights and methodologies able to make learning environments more effective and efficient. In recent years, most of the literature has focused on two issues that seem to be valuable levers that can promote the structuring of learning settings: the collaborative approach among teachers and students, as well as the student-centered approach. Collaboration is not a new concept in education. It has been recognized as an important factor in enhancing learning outcomes (Vygotsky, 1978; Johnson and Johnson, 1989; Cohen and Lotan, 2014). Collaborative learning environments, in which students work together on tasks, can improve students' critical thinking, problem-solving, and communication skills (van Alten et al., 2019). Similarly, teacher collaboration has been found to lead to improved teaching practices, teacher morale, and student outcomes too (Butler and Schnellert, 2012; Kraft and Papay, 2014; Kelly and Cherkowski, 2015). On the other hand, the student-centered approach in educational settings is widely advocated as an effective teaching method (Bernard et al., 2019). This approach emphasizes the importance of students taking an active role in their learning rather than

passively receiving information from the teacher (Johnson et al., 2000; Yoder, 2014) and prioritizes the wellbeing and development of individual students, recognizing that every student has unique needs and learning styles (Bernard et al., 2019).

Despite evidence of the importance of collaboration and student-centered approaches in learning environments, there are still some difficulties in schools in transforming these approaches and methodologies into daily learning practices to be applied in learning environments and classrooms. The causes are usually explained in terms of a tradition of teachers' isolation finalized at guaranteeing their autonomy and independence, which in turn is linked to the mostly individual activities in which preservice teachers are involved in their professional training (Levine and Marcus, 2007; Steyn, 2016; Queupil et al., 2021; Ke et al., 2023; Rihter et al., 2023).

In our view, these difficulties in implementing evidence-based methodologies and daily practices could be understood in terms of the different approaches that teachers enact in learning environments; namely, the specific teaching cultures organizing teachers' methodological and technical choices through which they sustain learners (Lam and Kember, 2006). In other terms, the difficulties in implementing evidence-based methodologies and approaches are linked to the cultural views that teachers themselves hold regarding the function of teaching within the school. This perspective, although shared in the educational literature (Gennaro et al., 2017; Keppens et al., 2021; Eßling et al., 2023), hardly finds empirical confirmation, given the lack of instruments able to detect the different approaches that drive educators and teachers in schools and learning environments.

The attitudes and behaviors enacted by teachers in terms of techniques and methodologies in learning environments promoting collaboration and the student-centered approach are not isolated but derive from a broader cultural framework concerning the specific way in which teachers give meaning to teaching practices. Accordingly, in the present study, we will first highlight recent insights about the importance of collaboration and the student-centered approach in the learning environment, then offer a theoretical framework—the Semiotic Cultural Psychological Theory (SCPT)—framing the TAS and, finally, we will present the development and factor structure of the TAS, a tool able to capture teachers' viewpoints on teaching approaches.

1.1 The role of collaboration in the learning environment

Teacher collaboration occurs when "teachers engage in constructive dialogue that furthers the educational vision of the school" (Gruenert, 2000, p. 15). Collaboration is the process of sharing ideas, experiences, and resources to achieve common goals (Gruenert and Whitaker, 2015) and can have a positive impact on professional growth and development (De Jong et al., 2022). Teachers who collaborate with their colleagues are more likely to share their experiences, knowledge, and skills, providing opportunities for feedback and reflection that can lead to improved teaching practices (Opfer and Pedder, 2011; Chiong et al., 2017). Research has shown that teachers who engage in collaboration have higher levels of self-efficacy and job satisfaction (Skaalvik and Skaalvik, 2021), are more motivated (Shah, 2012) and are less likely to leave the profession (Heider, 2015). Moreover, teachers collaboration can lead to increased innovation and creativity: collaborating teachers can brainstorm new ideas and different approaches to teaching (Nielsen and Jensen, 2021), which can enhance the quality of education and provide students with more engaging and effective learning experiences (Carbone et al., 2019).

Teachers' collaboration can also have a significant impact on students' academic achievement and social development. When teachers collaborate, they can develop a shared understanding of students' needs and strengths and work together to create a supportive learning environment. Research has shown that positive and supportive teacher interactions and relationships between teachers and school administration are critical factors contributing to teachers' collective efficacy (Lee et al., 2011; Skaalvik and Skaalvik, 2019; Berglund, 2022). Therefore, fostering favorable and effective collaboration among teachers is essential for creating a positive school climate, which has been linked to improved student motivation, achievement, and teacher job satisfaction (Bower and Parsons, 2016). Moreover, teacher collaboration contributes to educators' ongoing professional growth by facilitating the sharing of best practices, improving teaching strategies, and providing mutual support. This collegiality not only improves teachers' teaching skills but also leads to a more cohesive and supportive school environment (Vangrieken et al., 2017a). Finally, a positive school climate fostered by collaborative practices has been seen to have a significant impact on student achievement. Specifically, when teachers work together, they create a more coherent and unified approach to teaching and learning, which in turn increases student engagement and achievement. This collaborative culture promotes a sense of community among students, encouraging them to take an active role in their learning process (Johnson et al., 2012).

1.2 Evidence on a student-centered approach

When we think of teachers, we see them engaged in actions promoting students' learning, for example: lecturing, assigning tasks, evaluating them, and giving feedback to the students on the achievement of the learning goals. These actions can take different forms according to the approach adopted by teachers and the role they expect students to play in their learning process.

A solid research tradition has accumulated evidence that a teaching approach placing students at the center of their learning process may improve the quality of learning and the students' academic achievement (Ulum and Tümkaya, 2022). This is quite different from the more traditional teacher-centered approach, in which the student's role is to follow the teacher's directions, accomplish the tasks assigned by the teacher, and have them evaluated.

A learner-centered approach may involve allowing students to participate in setting learning goals, to make decisions about the pace, methods, and activities to pursue them, and to self-assess their achievement and acquired competencies (Bernard et al., 2019). In some cases, this approach can also be implemented in a classroom with a specific social participation structure, such as in learning communities, cooperative learning, and peer tutoring, enhancing the social dimension of the learning process (Ligorio et al., 2005). Various meta-analyses have investigated the efficacy of student-centered learning, trying to identify relevant distinctive features and measure its efficacy compared to a more teacher-centered approach (e.g., van Alten et al., 2019; Brenmer, 2021; Ulum and Tümkaya,

2022). Several studies have tested the efficacy of the student-centered approach for individual student achievement and individual development (Serin, 2018). For example, Ulum and Tümkaya (2022) found in their meta-analysis that student-centered approaches were more effective than traditional teaching methods in mathematics achievement. On the other hand, student-centered approaches in education foster a vision of schools in which the student is at the center stage and in which the student's wellbeing and individual development are fundamental goals of the educational program alongside traditional learning outcomes. This means that the teacher adopts a comprehensive approach to students and their learning, addressing not only their cognitive needs but also recognizing their broader needs as individuals (Brenmer, 2021). Research indicates that effective teaching involves understanding and supporting students' emotional, social, and physical wellbeing (Jennings and Greenberg, 2009; Darling-Hammond et al., 2020). Consequently, schools become nurturing environments that foster the holistic growth of each student, promoting their academic success and personal development (Hargreaves and Fullan, 2015).

1.3 Research evidence

Various instruments have been developed to measure different dimensions of teachers' approach to teaching. In the context of collaboration in the learning environment, Vangrieken et al. (2017b) introduced an instrument designed to detect teachers' didactic-pedagogical autonomy (teachers' practical activities in the classroom, such as lesson preparation and classroom management), curricular autonomy (which focuses on curriculum content and educational goal-setting), and collaborative attitude (which assesses teachers' perceptions of the value and desirability of collaboration) with colleagues versus independent work. Johnson et al. (2007) developed the School-Level Environment Questionnaire (SLEQ) to measure teachers' perceptions of school climate by including five factors (collaboration, student relations, decision-making, and instructional innovation) designed to provide a broad view of the environmental aspects that influence teaching practices. Again, Woodland et al. (2013) created the Teacher Collaboration Assessment Survey (TCAS), which operationalizes and measures four key domains of teacher collaboration: dialogue, decision-making, action, and evaluation. This instrument is used to assess the quality of teacher teams involved in district-level school reform initiatives in the Northeastern and Mid-Atlantic regions of the United States.

In the context of the student-centered approach, an inventory was developed to measure teachers' beliefs about student-centered education based on four components of the educational curriculum: instructional goals, content, instructional strategies, and instructional assessment (Isikoglu et al., 2009). Furthermore, the authors showed that although preservice teachers believed that curriculum goals should be student-centered, they were less likely to consider student-centered teaching strategies useful (Isikoglu et al., 2009). Finally, Boyaci et al. (2017) developed a scale to measure teachers' levels of practice of student-centered education. The authors found that teachers who scored high on the scale had higher levels of student-centered educational practices, while those who scored low had lower levels of student-centered educational practices.

The study of these domains has to date produced specific intervention models (cf. § 1.1 and 1.2). However, the promotion of such interventions cannot be separated from attention to the more general dimension that organizes the interventions themselves. Therefore, despite the valuable contributions made by the tools developed so far, they do not provide insight into the generalized underlying patterns that drive specific approaches. Moreover, although attention to the general dimension is not a new aspect in the literature (e.g., Matsopoulos et al., 2019), to date there are no tools to capture it. Therefore, there is a need to develop a holistic tool that can capture teachers' perspectives on teaching approaches. In this direction, the study of generalized dimensions assumes particular importance because they play a key role in guiding the attitudes and behaviors that lead to the design and implementation of policies aimed at ensuring the quality of education.

1.4 Theoretical framework

A huge body of psychological literature (Vygotsky, 1978; Neisser, 1987; Bruner, 1990; Kahneman and Tversky, 2000; Kahneman, 2011) highlighted that individuals comprehend events and elements within their environment—and subsequently act—based on a comprehensive understanding of the context in which they are embedded. This perspective finds empirical support in SCPT (Valsiner, 2007; Salvatore, 2016, 2018; Salvatore et al., 2018, 2019; Russo et al., 2020; Cremaschi et al., 2021), which emphasizes that cognitive processes are mediated—guided, structured, and modeled—by semiotic resources such as beliefs, images, values, scripts, rituals, and worldviews. These resources are rooted in embodied meaning patterns that are embedded in the cultural practices of the social group (Vygotsky, 1978; see also Cole, 1996; Valsiner, 2007). This view has been corroborated across various fields of research. For instance, some studies have shown that voting behavior is influenced by how voters interpret the broader sociopolitical context (Veltri et al., 2019; Mannarini et al., 2020; Andreassi et al., 2023). Rochira et al. (2020) and Cordella et al. (2023) illustrated how attitudes toward vaccination depend on interpretations of the socio-institutional context. Reho et al. (2024) showed that the relationship between wildfire risk perception and preventive actions is shaped by individuals' interpretations of their social environment. In the field of educational psychology, Matsopoulos et al. (2019) highlighted how teachers' broader identities and attitudes toward the state play an important role in the successful design and implementation of quality assurance policies in education. In sum, the SCPT suggests that the broader interpretation of the context shapes the attitudes and behaviors enacted by individuals. According to such a view, the study of teaching approaches should go beyond the analysis of teaching techniques *per se* and consider how cultural and contextual interpretations influence educational practices. Teaching techniques are deeply rooted in the socio-cultural context in which they are applied. Teachers, as social agents, bring with them a wealth of beliefs, values, and practices derived from their cultural background and personal and professional experiences. This background influences not only their teaching methodologies but also how they interpret and respond to classroom dynamics, student needs, and educational policies. For example, a teacher who values cooperation and collectivity might adopt teaching techniques that promote teamwork and student collaboration. Conversely, a teacher who emphasizes autonomy and

individualism might prefer methodologies that encourage student independence and self-reliance. Thus, the emphasis on collaboration and a student-centered approach are the results of these underlying cultural and contextual interpretations. This integrated perspective provides a better understanding of the variables that influence the effectiveness of pedagogical practices and how they can be adapted to meet the diverse needs of students. Moreover, an integrated approach that considers cultural and contextual interpretations enables the development of more targeted and effective training interventions for teachers, supporting them in acquiring intercultural competencies and critically reflecting on their practices. This can lead to greater sensitivity and adaptability to the various cultural realities present in classrooms, thereby improving the educational experience for all students.

1.5 Teaching approach scale

The present study presents the development and factor structure of the TAS, a tool designed to capture teachers' views on teaching approaches understood as systems of assumptions that, according to the theoretical framework mentioned above, organize teachers' attitudes and behaviors. The TAS integrates multiple dimensions such as individual student characteristics (i.e., recognizing diverse learning styles and abilities), collaborative efforts (i.e., teamwork among students and teacher collaboration on classroom strategies and climate), wellbeing considerations (i.e., prioritizing student welfare and involving families), and teacher participation (i.e., professional development and tailored teaching to meet class needs). The choice of issues arises from findings in the scientific literature (van Alten et al., 2019; Emanet and Kezer, 2021; Ulum and Tümkaya, 2022), which highlight that, in school environments, collaboration and a student-centered approach are effective teaching models in terms of student learning achievements. Furthermore, the TAS considers wellbeing as a critical component of the educational process. Research (Klusmann et al., 2008) indicates that students' and teachers' wellbeing has a significant impact on the quality of education, and by incorporating wellbeing considerations, the TAS recognizes the interdependence between emotional and academic success. Finally, teacher participation is another key element of the TAS: teachers shape and adapt teaching practices according to the contextual needs of their classroom (Flores and Day, 2006).

2 Method

The development of the scale followed a three-step procedure: (a) item identifications through a consensus procedure, (b) EFA aimed to uncover the underlying structure of educator's teaching approach, and (c) a CFA aimed to test the consistency of the retrieved factors paving teaching approach.

2.1 Sample

At an early stage, school principals were contacted to check the schools' willingness to participate in the study. After obtaining schools' approval, data were collected through an online survey filled out by the teachers using the Google Forms platform. The survey consisted of the two scales developed and some questions designed to collect the socio-demographic and other characteristics of the respondents. Completion of the questionnaires took approximately 15 min. The study was approved by the Ethical Committee of the [Edited for blinded review] (Prot. n. [Edited for blinded review]). All procedures performed in the study complied with the ethical standards of the institutional research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. Respondents were informed of the general purpose of the research, anonymity of responses, voluntary nature of participation (there were no exclusion criteria other than not understanding Italian), and signed informed consent. No incentives were given. A sample of 642 Italian teachers was recruited and randomly split into two sub-samples (Pronk et al., 2022): sub-sample 1 ($N = 325$) and sub-sample 2 ($N = 317$). Table 1 shows the characteristics of the total sample and sub-samples 1 and 2.

2.2 Data analysis

2.2.1 Items identification

Qualitative interviews were conducted with teachers and experts to explore the different dimensions underpinning the teaching approach. Thereafter, a pool of 35 items was generated to be rated on a 4-point Likert scale (1 = strongly disagree, 4 = strongly agree) to draw out teacher's expressions about teaching action considering education comprehensively, namely, integrating aspects dealing with student individuality, collaboration, wellbeing, and teacher involvement to enhance the overall school experience. Three independent expert judges (having at least a PhD degree in educational psychology or educational pedagogy) reviewed the items in terms of content and appropriateness following the consensus procedure recommended by Stiles (1997). Fifteen items were considered ambiguous or subject to response bias and were therefore omitted from the item pool. This process resulted in a pool of 20 items for the first version of the TAS.

2.2.2 Exploratory (EFA) and confirmatory factor analysis

Sub-sample 1 was used for the EFA to establish the factorial structure of the scale; sub-sample 2 was used in the subsequent CFA to confirm the factorial structures found with the EFA. Data analyses were conducted using IBM SPSS Statistics (version 26) and the RStudio software environment (RStudio Team, 2015) using the Lavaan package (version 0.6–12; Rosseel, 2012).

To check the suitability of the data for the EFA, the Kaiser–Meyer–Olkin (KMO) and Bartlett's test were used to assess sampling adequacy and the matrix identity, respectively. According to the literature, the value of KMO must be greater than 0.60, and Bartlett's test must be significant to conduct a factor analysis (Shrestha, 2021). The EFA was conducted using the principal axis factoring (PAF) extraction method and the varimax rotation. The number of factors to retain was determined by the inspection of the scree plot and the criterion of the eigenvalues equal to or greater than 1.00 (Kline, 1994; Pett et al., 2003). A value of 0.40 was accepted as the minimum limit of factor loading (Stevens, 2012), and cross-loading items were considered for exclusion because they were ambiguous and confounding, thus not interpretable (Netemeyer et al., 2003).

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TABLE 1 Socio-demographic characteristics of the total sample, sub-sample 1, and sub-sample 2.

		Total sample $N = 642$ teaching experience (3.01 ± 2.03)		Sub-sample 1 $N = 325$ teaching experience (2.87 ± 1.93)		Sub-sample 2 $N = 317$ teaching experience (3.16 ± 2.13)	
		N	%	*N*	%	*N*	%
Gender	Women	547	85.2	276	84.9	271	85.5
	Men	89	13.9	47	14.5	42	13.2
	I prefer not to answer	5	0.8	2	0.6	3	0.9
	Other	1	0.2	0	0	1	0.3
Role	Support teachers	115	17.9	51	15.7	64	20.2
	Enrolled teachers	282	43.9	134	41.2	148	46.7
	In training support teachers	209	32.6	126	38.8	83	26.2
	NA	36	5.6	14	4.3	22	6.9

The CFA was applied to sub-sample 2 to test the factorial structure found in the EFA. Based on the literature, various goodness-of-fit indices were used (Tanaka, 1993; Tabachnick and Fidell, 2001; Kline, 2005). Specifically, the following indices were included: chi-square (χ^2) test, comparative fit index (CFI), Tucker–Lewis index (TLI), standardized root mean square residual (SRMR), and root mean square error of approximation (RMSEA) plus its 90% confidence interval (CI). A non-significant χ^2 indicates a good model fit, while incremental or comparative indices (CFI, TLI) with values greater than 0.90 or 0.95 indicate a good fit to the data (Bentler, 1990). The SRMR index indicates a good fit if its value is less than 0.08 or.10. For the RMSEA index, a value greater than 0.10 indicates a poor fit, between 0.08 and 0.10 mediocre, between 0.05 and 0.08 acceptable, between 0.02 and.05 good, and less than.02 indicates excellent fit (Hu and Bentler, 1999). Since the data violated the assumptions of multivariate normality (Mardia coefficient = 26.17), the model was estimated using the robust maximum likelihood (ML) method, which provides unbiased parameter estimates, corrects standard errors for non-normal data, and adjusts model fit indices (Satorra and Bentler, 2001).

3 Results

3.1 Exploratory factor analysis

The 20 identified items were subjected to EFA, the KMO sampling adequacy measure was.87, and Bartlett's test of sphericity was significant ($\chi^2[190] = 2170.37$; $p < 0.001$). The EFA extracted four factors (Table 2) with eigenvalues greater than 1.0, which explained 41.60% of the variance. Eight of the 20 items were found to have factor loading below the threshold of.40 or were found to cross-load more than one factor: therefore, they were excluded and further EFA was performed. Again, the KMO (0.80) and Bartlett's test ($\chi^2[66] = 1230.73$; $p < 0.001$) confirmed the factorability of the data. Four factors were extracted, explaining 49.43% of the total variance. Each factor was saturated by three items. Items 8, 10, and 12 were omitted for interpretation due to their high loadings on both factors 1 and 2.

According to the items' loading, the factors were interpreted as follows: the first factor identified was the *development of students' autonomy*. This factor reflects the idea of encouraging students to work together, to provide support to each other through peer tutoring, to adopt cooperative learning strategies, and to be aware of their growth through self-evaluation.

The second gathered factor, *comparison and synergy in the teacher's group*, includes items dealing with the idea that dialogue and collaboration among teachers are fundamental to addressing issues related to classroom climate, teaching strategies for struggling students, and setting overall school goals.

The third factor was the *development of the student as a person*. The items emphasize the idea that school is not only limited to the transmission of academic knowledge, but also aims to form well-rounded individuals, responsible citizens, and to promote their general wellbeing and personal growth.

Finally, the fourth factor, named *standardization of teaching*, contains items concerning the idea of applying a uniform model or approach to all students without considering their differences.

3.2 Confirmatory factor analysis

The CFA was performed on sub-sample 2 to test the factorial structure of the scale. The model (Figure 1) presented adequate fit indices for the four-factor solution. The chi-square test was non-significant ($\chi^2[48] = 57.40$, $p = 0.166$), and the CFI = 0.99 and the TLI = 0.98 exceeded the most conservative threshold value of.95. The SRMR = 0.04, RMSEA = 0.02 and CI (lower = 0.00; upper = 0.04) indicated a good fit. Cronbach's alpha showed acceptable values of internal consistency for three out of four dimensions of the TAS (86, 0.79, 0.70, and.55, respectively).

4 Discussion

The purpose of the present study was to develop and test the factor structure of the TAS, a tool for assessing educators' viewpoint of their approach to teaching, with a focus on collaboration and student-centeredness.

The EFA yielded four factors referring to the development of students' autonomy, the comparison and synergy in the teacher's group, the development of the student as a person, and the standardization of teaching, respectively. The following CFA

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TABLE 2 Exploratory factor analysis (EFA) results: factor loadings.

Items	Factor 1	Factor 2	Factor 3	Factor 4
1. School is aimed at the formation of man and citizen[a]			**0.639**	
2. It is important to confront colleagues in class council relative to classroom climate[a]		**0.675**		
3. It is important to confront with colleagues in class council relative to strategies for supporting struggling students[a]		**0.811**		
4. School is aimed at developing the skills necessary for the efficient performance of particular roles in society			0.311	
5. The welfare of the student must be an educational priority of the school[a]			**0.480**	
6. It is important to discuss with colleagues the general purposes of the school[a]		**0.649**		
7. School is a place of reproduction of sociocultural inequalities				0.330
8. It is important to involve families in the school's educational project	0.494	0.543		
9. School is a protected place of learning in which error represents an opportunity for growth			0.335	
10. It is important to involve the local area in the school's educational project	0.499	0.551		
11. The school must be selective[a] (R)				**0.419**
12. It is important to plan teaching activities according to the needs detected in the class	0.560	0.432		
13. It is important for the teacher, as a rule, to propose the same activities to all students[a] (R)				**0.467**
14. The teacher must make all pupils achieve basic skills			0.359	
15. It is important for the teacher to plan class activities with the average learner in mind[a] (R)				**0.625**
16. School is aimed at the growth and full development of the individual[a]			**0.579**	
17. It is important to offer peer tutoring activities to learners[a]	**0.729**			
18. It is important to carry out cooperative learning activities in the classroom[a]	**0.770**			
19. It is important to offer pupils strategies and tools to develop learning self-assessment skills[a]	**0.690**			
20. It is possible to bring all pupils to the achievement of the intended goals	0.313			

[a]retained items; R: reverse item.

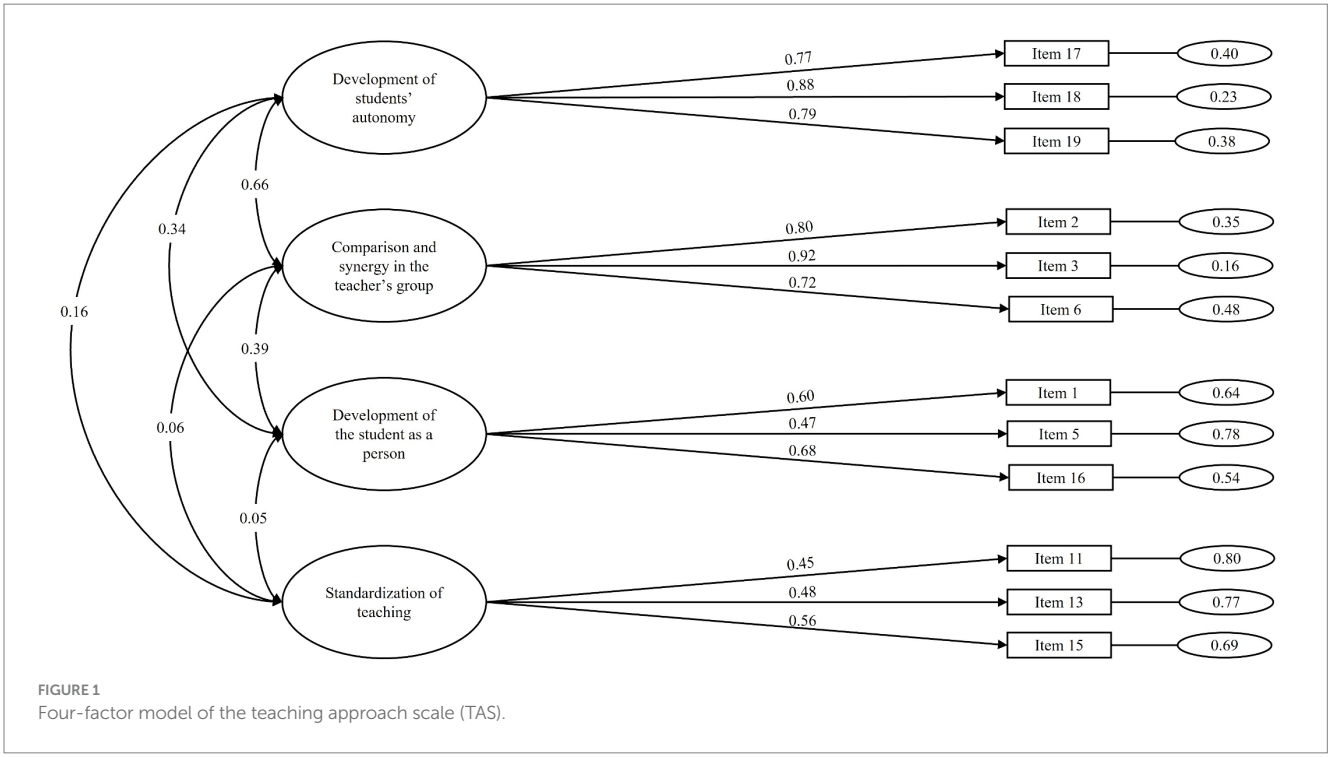

FIGURE 1
Four-factor model of the teaching approach scale (TAS).

confirmed the four-factor structure of the TAS by showing a good model fit.

Overall, the results highlight the TAS ability to consider the two dimensions that the literature has shown to be fundamental in the context of teaching—the collaboration in the learning environment and the student-centered approach—in a wider perspective: namely, as results of a teacher's cultural approach to teaching. Specifically, the *development of students' autonomy* aligns closely with student-centered

approaches as it emphasizes a view of teaching action aimed at empowering students to take charge of their learning, fostering independent thinking and self-regulation skills. *Comparison and synergy in the teacher's group* refers to an approach that directly supports collaboration, encouraging teachers to work together, share best practices, and develop a cohesive teaching strategy that benefits from collective expertise. *Development of the student as a person* is a view that aligns with the student-centered approach, focusing on the holistic growth of students, addressing their emotional, social, and personal development along with academic achievements. Finally, *standardization of teaching* refers to a view that can indirectly support collaboration by establishing common frameworks and expectations that facilitate coordinated efforts among teachers while maintaining a focus on student-centered methodologies. These aspects produce important outcomes not only in teaching practices (Butler and Schnellert, 2012; Kraft and Papay, 2014; Kelly and Cherkowski, 2015; Carbone et al., 2019), but also in teachers themselves (De Jong et al., 2022) and students learning outcomes (Brenmer, 2021).

Therefore, the TAS has proven to be a tool capable of capturing teachers' cultures: that is, the general approaches through which they conceive and manage learning environments. Beyond the specific results (i.e., the initial evidence from the scale), the utility of the TAS lies in its ability to offer a comprehensive, evidence-based tool for assessing teachers' approaches to teaching practice. Rather than focusing exclusively on techniques and attitudes, the TAS emphasizes teachers' interpretation of the purpose of their professional actions, which results in attitudes that foster the implementation of collaborative practices and student-centered approaches.

In this context, the TAS does not merely evaluate the practices implemented by teachers. Instead, it provides a deeper understanding of the subjective cultural dynamics that influence teaching methodologies. These dynamics shape how teachers interpret and respond to various classroom situations, student needs, and educational policies. By capturing these interpretive nuances, TAS helps to understand the broader cultural and contextual factors that influence teaching practices.

Finally, from a wider theoretical perspective, the results obtained are consistent with a cultural perspective, suggesting that teachers' view of teaching and learning contexts influence the specific way in which these contexts are constructed and how instructional practice is delivered to students (Gennaro et al., 2017). Such a perspective is consistent with the theory of semiotic-cultural psychology, which conceives culture as a kind of "affectively driven" knowledge (Salvatore and Freda, 2011) of the functional modalities that regulate individuals' actions. In this view, teachers' cultures, namely teaching approach, are reflected in educational practice: teachers' educational approach is the result of individual subjective cultures concerning teaching, which are actualized in learning models, methods, adopted procedures, and methodologies; moreover, inter-individual differences in conceiving teaching action reflect the consistency between beliefs, feelings, and actions motivated by the culture to which the educator belongs.

From the perspective of intervention, the development of the TAS provides a holistic assessment of teaching approaches by considering four widely recognized dimensions (development of students' autonomy, comparison and synergy in the teacher's group, development of the student as a person, and standardization of teaching) that helps to understand the multifaceted nature of teaching and learning and supports school policy making in terms of teacher formative intervention that is not merely focused on techniques.

5 Limits and conclusion

Needless to say, the study should be regarded as a first step in the development of the scale, and the actual limitations are open to further investigations. First, the online dissemination of the survey may have limited the enrolment of participants without internet access. The use of a self-report instrument may have led to a social desirability bias that may have influenced the responses of the participants in the present study. Accordingly, future research will focus on constructing the validity of the retrieved factors, comparing the TAS with other instruments and investigating test–retest validity. Second, the dimension of the standardization of teaching, which shows low internal consistency in factor 4, requires further investigation. Future studies should determine whether this inconsistency is due to the specific characteristics of the sample in the present study or whether the fact that the items are formulated in a reverse scale may cause misunderstanding among respondents. Moreover, future studies with larger samples from schools of different educational levels should be conducted to confirm the factorial structure of the scale. The TAS is an instrument that detects the approach to teaching based on teachers' interpretation of the broader cultural context. Therefore, the factorial structure could vary depending on the cultural milieu in which the scale is administered. In addition, teachers' teaching experience could influence their approach to teaching. Future studies should consider this to validate the instrument on the general population of teachers, regardless of their experience, the level of the school in which they teach, and the cultural milieu within which they are embedded. Furthermore, according to recent innovative ways of questionnaire construction (Dutriaux et al., 2023), it will be interesting in the future to develop measures based on specific educational practices and test the influence of TAS on them. In addition, considering factors such as teaching subjects and teacher training in future studies could contribute to the validity and reliability of the TAS. Finally, the cultural interpretation proposed and discussed above should be further investigated by analyzing the association between generalized interpretive modalities of experience (people's worldviews) and the TAS. This would demonstrate how people's worldviews act on specific patterns of interpretation of the school context, which in turn translate into specific teaching practices.

Overall, the present study offers both practical and theoretical implications. On a practical level, a scale able to focus teaching approach will provide schools with the opportunity to identify areas of strength and weakness in educators' approach to teaching, allowing them to develop targeted training programs to improve the quality of teaching. On the other hand, teachers could benefit from the TAS results by receiving constructive feedback on their teaching style, contributing to their professional development by encouraging reflection and adaptation of teaching practices.

Moreover, the TAS seems a valuable tool for promoting teachers' professional growth, improving students' learning experience, and guiding educational and policy decisions that enable schools' investments to be more effective in improving student learning.

At a theoretical level, the present study suggests the need to move beyond research approaches focused on teaching practices (e.g., teaching methodologies, development of specific learning environments, and use of technology) to focus on the cultural dimensions that mediate the adoption of those practices. Accordingly,

this study emphasizes how subjective cultures—namely, how people position themselves within the cultural context and conceive of professional practices, such as teaching actions—should be taken into account to improve educational procedures since individual views about teaching and learning environment determine what educators do daily as teachers.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving humans were approved by Ethical Committee of the Department of Dynamic and Clinical Psychology, and Health Studies, Sapienza University of Rome (Prot. n. 0001547, 11/10/2021). The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

MR: Data curation, Formal analysis, Methodology, Writing – original draft, Writing – review & editing. SC: Data curation, Investigation, Writing – original draft, Writing – review & editing. SP: Conceptualization, Data curation, Investigation, Project administration, Supervision, Writing – original draft, Writing – review & editing. PL: Investigation, Methodology, Supervision, Writing – review & editing. RF: Investigation, Methodology, Writing – review & editing. AG: Conceptualization, Data curation, Formal analysis, Methodology, Project administration, Supervision, Writing – original draft, Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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