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Research paper

Exploring the circumplex model of motivating and demotivating teaching styles: The role of teacher need satisfaction and need frustration

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ABSTRACT

This study explored the relationships between teacher satisfaction/frustration of the three basic psychological needs for competence, autonomy and relatedness, and adoption of motivating and demotivating teaching styles. Nine hundred and forty-nine Italian teachers filled in self-report questionnaires. The results showed that competence and relatedness satisfaction were associated with the participative, attuning, guiding, and clarifying motivating subareas. Although competence frustration was associated with all the demotivating subareas, relatedness frustration was only associated with the domineering and abandoning subareas. Autonomy frustration was associated with the demanding, domineering, and awaiting subareas. The theoretical and practical implications for fostering teachers' motivating style are discussed.

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Teachers' behaviors and reactions to typical school situations can foster or undermine autonomous student motivation and engagement (e.g., Aibar et al., 2021; Collie et al., 2019; Reeve & Shin, 2020). Being enthusiastic (e.g., Keller et al., 2016; Lazarides et al., 2018; Moè, 2016a; Moè et al., 2021), displaying care and concern (e.g., Dobransky & Frymier, 2004), conveying the value of learning (e.g., Gaspard et al., 2015) and supporting students' autonomy (e.g., Cheon et al., 2020; Diloy-Peña et al., 2021) are all ways through which teachers can enhance their students' autonomous motivation (Jang et al., 2016; Van den Berghe et al., 2013; 2014).

This relationship between teachers' supportive behaviors and students' autonomous motivation to learn has been reported in dozens of studies based on the theoretical principles of Self-Determination Theory (SDT: Ryan & Deci, 2017; Vansteenkiste & Ryan, 2013). These findings show that teachers foster students' autonomous motivation when they satisfy rather than frustrate their students' basic psychological needs for competence (experiencing mastery and effectiveness), autonomy (perceiving

ownership and freedom), and relatedness (feeling supported and close to others). Aelterman et al. (2019) developed the Situations-in-School scale (SIS), a comprehensive scale to assess teacher adoption of behaviors that support or thwart student needs. They distinguished between two need supportive motivating styles (autonomy support and structure) and two need thwarting demotivating styles (control and chaos). Each style was then divided into two subareas of specific behaviors: participative and attuning (autonomy-supportive style), guiding and clarifying (structuring style), demanding and domineering (controlling style), abandoning and awaiting (chaotic style). See Table 1 for a detailed description of the styles and subareas.

This scale provides researchers with a coherent, theoretically-based instrument to assess motivating and demotivating teaching styles and their subareas and can contribute to a better understanding of why some teachers support their students' autonomy and structure their teaching more than others. Aelterman et al. (2019) and Moè and Katz (2020; 2021) suggested that the more teachers feel that their needs for autonomy, competence, and relatedness are satisfied, the more resources they have to act in a supportive way towards their students and thus use a more

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Table 1
Characteristics of motivating and demotivating teaching styles and their respective subareas.

Style	Subarea	Characteristics	Example items	
Motivating	Autonomy Support	Participative	Identify student interests, offer meaningful choices, engage in dialogues with students	Invite students to suggest a set of guidelines that will help them feel comfortable in class
		Attuning	Accept expressions of negative affect, make the material engaging/enjoyable, allow students work at their pace	Try to find ways to make the lesson more interesting and enjoyable for the students
	Structure	Guiding	Provide help and assistance when needed, favor reflection on mistakes, adopt a progress-oriented focus	Offer help and guidance
		Clarifying	Communicate clearly what is expected, offer an overview of the lesson, monitoring progress	Communicate the classroom expectations for cooperation and prosocial skills
Demotivating	Control	Demanding	Exert power, insist the students do what they are told, use commanding language, stress duties and discipline	Post your rules. Tell students they have to follow all the rules. Post the sanctions for disobeying the rules
		Domineering	Criticize students, use aggressive language and attitudes, yell, threaten punishment, induce guilt and shame	Insist firmly that "Now is the time for hard work!"
	Chaos	Abandoning	Give up and leave the students without guidance on what is needed and how to achieve their goals	Let it go, because it is too much trouble to intervene
		Awaiting	Adopt a laissez-faire attitude, with no planning, and wait to see how things will evolve	Lack of concern about rules and regulations

supportive style. However, these studies only considered composite scores for need satisfaction/frustration and motivating/demotivating styles.

Unlike previous studies that have assessed one or only a few teaching styles (e.g., Abós et al., 2018a; Soenens et al., 2012) or the four general styles suggested by Aelterman et al. (2019), but not their subareas (e.g., Moè & Katz, 2020; 2021), the current study assessed the associations between each of the three needs satisfaction and frustration separately, and the eight subareas of the four styles (i.e., participative, attuning, guiding, clarifying, demanding, domineering, abandoning, and awaiting).

Consistent with Haerens et al. (2015), two paths between the variables were investigated: the *bright* path between teacher satisfaction of each of the three needs and adoption of the four motivating subareas, and the *dark* path between teacher frustration of each of the three needs and adoption of the four demotivating subareas. This fine-grained examination of the specific relationships between each need satisfaction and teachers' tendency to prefer motivating subareas, and between each need frustration and teachers' tendency to prefer demotivating subareas was designed to form the groundwork for more targeted interventions to foster motivating teaching styles and student autonomous motivation.

1. Need satisfaction and frustration as predictors of motivating and demotivating styles

The predictors of the adoption of motivating and demotivating styles can be differentiated into factors that either pressure teachers or support them from above, below, or within (Reeve, 2009). From below, teachers can become less autonomously motivating and more controlling when they observe student demotivation, misbehavior, or lack of compliance in the classroom. Teachers can become more autonomy-supportive when they perceive their students as autonomously motivated (e.g., Pelletier et al., 2002). From above, teachers can become less autonomously motivating when faced with time constraints, the prioritization of performance and grades, a crammed curriculum or other administrative or principal-related constraints (Taylor et al., 2008). By contrast, teachers tend to be less controlling and more autonomy-supportive when they experience their workplace as supportive (Eyal & Roth, 2011). Teachers' traits (Olesen et al., 2010; Reeve et al., 2018), teachers' beliefs as to what motivates students (Katz & Shahar, 2015; Soenens et al., 2012), and the beliefs in malleability of student intelligence (Vermote et al., 2020), as well as teachers'

motivation to teach (e.g. Abós et al., 2018; Katz & Shahar, 2015; Ryan & Deci, 2017; Soenens et al., 2012; Vermote et al., 2020) affect teachers' adoption of a motivating or a demotivating style from within. For example, Vermote et al. (2020) assessed the association between teacher motivation at the college level and the adoption of motivating and demotivating styles using the Aelterman et al. (2019) circumplex model. They found that teachers' autonomous motivation was associated with motivating behaviors (e.g., the guiding and attuning subareas), whereas controlled motivation and a-motivation related to demotivating (e.g., the domineering and abandoning subareas).

Recent studies have examined teachers' experiences of need satisfaction and need frustration (i.e. their experience of warm or distant relationships in the workplace, high vs. low competence and autonomy), as central factors leading to the adoption of motivating or demotivating teaching styles (e.g., Aelterman et al., 2019; Moè & Katz, 2020; 2021). The findings suggest that when teachers feel their needs are satisfied, they have greater resources to support their students. In particular, teachers' need satisfaction was shown to lead to higher adoption of autonomy-supportive and structuring styles. In contrast, teachers' experiences of need frustration fueled the adoption of a chaotic style and, to a lesser extent, a controlling style (Aelterman et al., 2016, 2019; Moè & Katz, 2020; 2021).

Although these studies highlighted the importance of supporting teachers' needs, only two collapsed scores of need satisfaction and frustration were considered. Aggregating in a single score the satisfaction and frustration of the three needs prevents to examine the specific contribution of the satisfaction/frustration of each specific need.

A study by Abós et al. (2021), although conducted with high school students, pointed strongly to the value of assessing the effects of satisfaction and frustration of each need separately. Their findings indicated that perceived teacher controlling behaviors led to student frustration of the needs for competence and autonomy, to a greater extent than relatedness. By investigating an aggregated measure of student experience of need satisfaction versus frustration, they may have overlooked important information about the effects of teacher behavior on student need satisfaction and frustration.

To the best of our knowledge, only one study (Abós et al., 2018b) examined the relationships between the satisfaction of each of the three needs and teacher adoption of motivating or demotivating styles. They found that competence satisfaction was more closely related than autonomy or relatedness satisfaction to adoption of

autonomy, relatedness, and task climate support styles and negatively to the ego climate support style. However, they only examined need satisfaction, and not frustration and considered a different set of styles than in Aelterman et al. (2019).

The purpose of the present study was to examine the specific relationships between the four motivating subareas and each of the three needs satisfaction and the four demotivating subareas and each of the three needs frustration. The overarching aim was to provide a fine-grained picture of this set of relationships to best design interventions to enhance teachers' motivating behaviors and thus students' autonomous motivation. The basic assumption was that the more teachers' needs are satisfied the more they are supportive and motivating, and the more their needs are frustrated the greater their adoption of controlling and chaotic behaviors.

1.1. Aims and hypotheses

This study assessed for the first time the entire set of relationships between teacher satisfaction and frustration of each of the needs for autonomy, competence, and relatedness and their adoption of motivating and demotivating behaviors.

Consistent with Haerens et al. (2015), we hypothesized a two-path model: the *bright* path (between teachers' satisfaction of each of the three needs and their tendency to be participative, attuning, guiding, and clarifying), and the *dark* path (between teachers' frustration of each of the three needs and their tendency to be demanding, domineering, abandoning and awaiting). In this model, the satisfaction of teachers' needs for autonomy, competence, and relatedness was posited to relate to the adoption of participative, attuning, guiding, and clarifying subareas. The frustration of teachers' needs for autonomy, competence, and relatedness was posited to relate to the adoption of demanding, domineering, abandoning, and awaiting subareas.

Preliminarily, we assessed the psychometric properties of the Italian version of the SIS by testing its internal and external validity, and the extent to which teachers adopt motivating or demotivating behaviors, and perceive their needs to be satisfied or frustrated.

As in Aelterman et al. (2019) and Moè and Katz (2020; 2021) we predicted that teachers would tend to adopt the motivating attuning, guiding and clarifying styles to a greater extent than the demotivating abandoning and awaiting styles. We predicted that the demanding style would be adopted more often than the domineering style. We expected that teachers would report greater need satisfaction than need frustration, but made no specific prediction about to the comparison between the three needs, due to the lack of previous research.

However, as these three needs are central in humans' emotional and social adaptation, there is evidence informing the hypothesized associations. For example, Abós et al. (2018b) showed that competence satisfaction plays a major role than autonomy and relatedness satisfaction in favoring the adoption of motivating styles. Parents tend to be more controlling and demotivating when they feel incompetent (Katz et al., 2011). Eyal and Roth (2011) suggested that school principals who are more autonomously motivated are also more autonomy-supportive towards their employees, the teachers. On the same line, Santana-Monagas et al. (2022) showed that when teachers experience high autonomy, their communication style with their students is more engaging. Conversely, teachers tend to use demotivating communication when their need for autonomy is thwarted. Spilt et al. (2011) demonstrated that teachers' experience of relatedness with their students informs their ability to support them better. On the contrary, thwarting the need to belong increases aggressiveness and reduces the tendency to be helpful (Baumeister et al., 2007).

2. Method

Participants and Procedure. This study is part of a larger project aimed at a better understanding of the factors associated with teachers' need satisfaction and frustration and their adoption of motivating and demotivating teaching styles. It was approved by the local Ethics Committee [deleted for peer review].

In the autumn of 2018, the spring of 2019, and the spring of 2020, online surveys were sent to large samples of Italian middle and high school teachers. After reading a description of the study, 949 teachers agreed to participate and signed the informed consent (585 females = 61.7%, 363 males = 38.3%), $M_{age} = 40.18$, $SD = 10.15$, years of teaching $M = 16.98$, $SD = 12.14$. Three hundred and nine taught in middle school (33.5%), and 614 in high school (64.7%). For the aims of this study the following measures were included: basic psychological need satisfaction and frustration, social desirability, and the SIS questionnaire described below. Of the sample, 28.1% taught languages, history, geography, and philosophy; 17.8% taught mathematics, science, physics, chemistry, and biology, 8% taught art, technology, and drawing, and 4.7% taught music, physical education, and religion.

2.1. Measures

Basic Need Satisfaction and Frustration. The BNSNF scale developed by Chen et al. (2015) was used in its Italian validation by Costa et al. (2018). It consists of 24 items to be rated on a 5-point Likert scale (1 = completely disagree; 5 = completely agree) to assess the satisfaction and frustration of each need. Example items for need satisfaction are: "I feel my choices express who I really am", "I experience a warm feeling with the people I spend time with", "I feel capable at what I do", respectively for autonomy, relatedness, and competence. Example items for need frustration are: "My daily activities feel like a chain of obligations", "I feel that people who are important to me are cold and distant towards me", "I feel like a failure because of the mistakes I make" respectively for the needs for autonomy, relatedness, and competence.

Social desirability. The Self-Deceptive Enhancement (SDE) subscale of the Balanced Inventory of Desirable Responding (BIDR; Paulhus, 1991) in the Italian validation by Bobbio and Manganeli (2011) was used. It presents eight items assessing the tendency to provide honest but positively biased self-reports to protect positive self-esteem; example item: "My first impressions of people usually turn out to be right") rated on a 6-point Likert scale (1 = completely disagree; 6 = completely agree).

Motivating and Demotivating Teaching Styles and their respective subareas were assessed using the SIS (Aelterman et al., 2019). This instrument consists of 15 scenarios depicting typical school situations that are either proactive (e.g., 'You present a difficult lesson that requires a lot of effort from the students') or reactive (e.g., 'A couple of students have been rude and disruptive') followed by 4 potential behaviors, related to one of the subareas of the four styles. Teachers are asked to self-rate their adoption of each of the potential behaviors characterized by different levels of provision of support vs. control and high vs. low directiveness (see Table 1 for example items). The scale was translated from English to Italian and then back-translated. The Appendix presents the full list of items to be rated on a 7-point Likert scale (1 = not at all; 7 = completely) together with the Italian translation.

The Cronbach's alphas for all measures are reported in Table 3.

2.2. Data analysis

To assess the internal validity of the SIS Italian version, a Confirmatory Factor Analysis (CFA) on the eight-factor model with

the 15 scenarios was performed. Then, an invariance analysis was run to verify that the data fit equally well for both genders and school levels. A multidimensional scaling (MDS) analysis was also conducted. External validity was assessed through correlation analyses among the motivating and demotivating subareas and need satisfaction/frustration while partialling out social desirability, as done by [Aelterman et al. \(2019\)](#).

To test the relationships among the 8 subareas and the 3 needs satisfaction and frustration, a path analysis was performed. The exogenous variables were the three basic psychological needs satisfaction and frustration. The outcome variables were the motivating (i.e., participative, attuning, guiding, and clarifying) and demotivating subareas (i.e., demanding, domineering, abandoning, and awaiting). The bright and dark paths were tested separately by assessing the full set of relationships among the needs satisfaction and motivating subareas and the needs frustration and demotivating subareas.

3. Analyses and results

First, a series of Student t-test was run to compare scores before (waves 2018 and 2019) versus during (Spring 2020) the COVID outbreak. No difference was found in the three needs satisfaction and frustration, and only 2 in the subareas: scores were slightly higher before than during COVID for the demanding ($M = 3.58, SD = 1.01$ before and $M = 3.37, SD = 0.96$ during COVID) and domineering ($M = 3.47, SD = 1.11$ before and $M = 3.19, SD = 1.03$ during COVID) subareas. Thus, given the small differences, all the participants were retained as a single group.

3.1. Validation results

The CFA indices were acceptable: $\chi^2 = 3411.36$ ($df = 1682$), $p < .001$; $\chi^2/df = 2.02$; CFI = 0.90; TLI = 0.89; RMSEA = 0.034; SRMR = 0.07 and in line with the fit achieved by [Aelterman et al. \(2019\)](#) in the final step of their study. Therefore, the eight-factor

model was confirmed. As shown in [Fig. 1](#), the factor loadings ranged from .31 to .80, except for item 1 of the demanding subarea, which was 0.11. Given that the model was confirmed and the indices were acceptable, all the items were retained.

Twenty-six participants did not report whether they were teaching in middle or high school; hence, the measurement invariance across school levels was run on the remaining sample ($N = 923$). [Table 2](#) presents the results. The main index (ΔCFI) was > -0.01 for both gender and school level in each step of the invariance analysis, suggesting a good fit. Concerning the school level, the scalar invariance and observed residual variances were in the range of acceptability ($\Delta CFI = -.009$ and $\Delta CFI = -0.008$, respectively). Furthermore, the ΔBIC was satisfactory since it was < 0 in every model. In general, complete invariance was supported for both gender and school level.

The MDS analysis (see [Fig. 2](#)) confirmed that the 15-scenario Italian version of the SIS could be graphically represented by a two-dimensional configuration accounting for 95% of the dispersion on a normalized raw stress value of 0.05. Four quadrants could be differentiated, with the autonomy support style items in the upper left and the controlling style items in the opposite quadrant. However, items 7, 8, and 10 of the attuning approach were not located in the hypothesized autonomy support style, but rather among the items related to structure. This overlap is not surprising since both the autonomy support and structure styles are considered need supportive and were expected to be adjacent in the geometric representation. Similarly, item 10 of the abandoning subarea was located to the right within the controlling items, whereas item 1 of the demanding approach was located among the chaotic items, probably due to the need thwarting nature of the chaotic and controlling teaching styles. Thus, the validity of the 15-scenarios Italian version of the SIS was confirmed.

3.2. Correlations among variables and mean differences

[Table 3](#) reports the descriptive statistics and correlations among

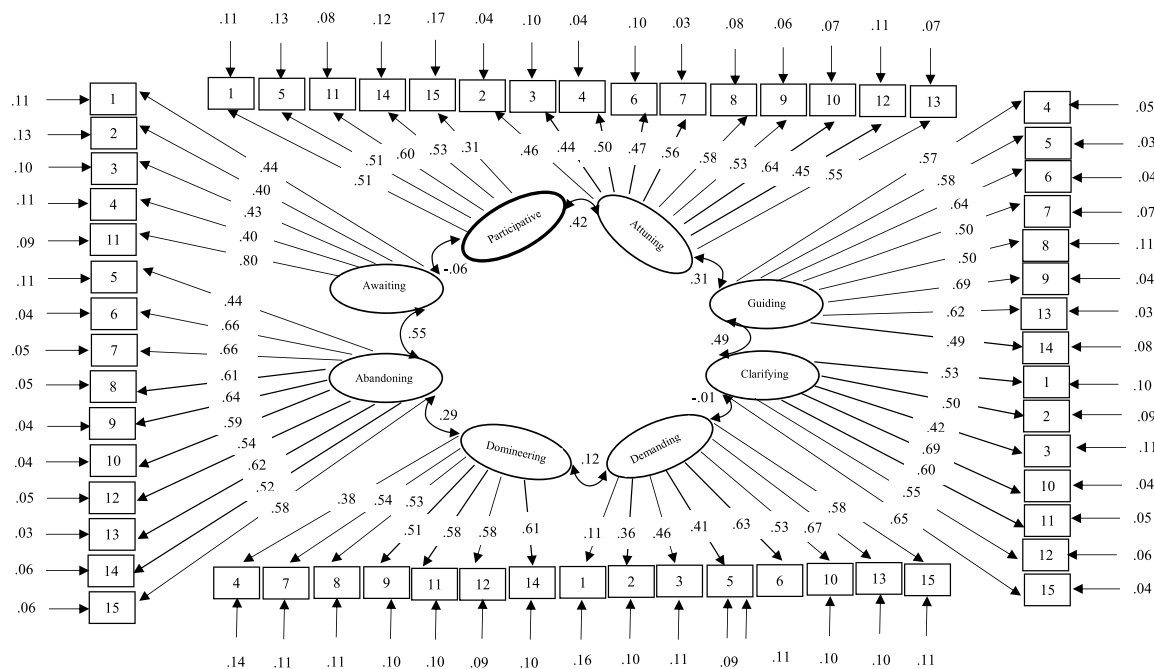


Fig. 1. Results of the Confirmatory Factor Analysis of the eight-factor model with 15 vignettes.

Table 2
Results of the invariance analyses across gender and school level.

Groups	Model	χ^2	df	p-value	CFI	TLI	RMSEA	SRMR	BIC	$\Delta\chi^2$	Δdf	p-value	ΔCFI	ΔBIC
gender	Female (n = 586)	3228.13	1682	<.001	.891	.873	.046	.055	—	—	—	—	—	—
	Male (n = 363)	2609.24	1682	<.001	.875	.866	.041	.059	—	—	—	—	—	—
	Configural invariance	5844.89	3364	<.001	.889	.877	.044	.055	192330.10	—	—	—	—	—
	Metric invariance	5902.24	3416	<.001	.888	.870	.043	.057	192038.70	57.35	52	.031	-.001	-291.4
	Scalar invariance	5978.41	3468	<.001	.887	.873	.043	.058	191755.38	76	52	.003	-.001	-283.32
	Residual invariance	6054.77	3528	<.001	.884	.873	.043	.059	191499.36	76.36	60	.011	-.003	-256.02
	Latent variances	6075.32	3536	<.001	.883	.873	.043	.067	191468.02	20.55	8	.003	-.001	-31.34
	Latent covariances	6090.07	3564	<.001	.884	.876	.043	.067	191298.25	14.75	28	.010	.001	-169.77
	Latent means	6113.68	3572	<.001	.883	.875	.043	.067	191267.80	23.61	8	.001	-.001	-30.45
school level	Middle school (n = 309)	2383.94	1682	<.001	.896	.883	.048	.063	—	—	—	—	—	—
	High school (n = 614)	3272.43	1682	<.001	.889	.878	.040	.052	—	—	—	—	—	—
	Configural invariance	5645.38	3364	<.001	.895	.884	.043	.054	187319.69	—	—	—	—	—
	Metric invariance	5717.78	3416	<.001	.894	.886	.043	.057	187045.68	72.4	52	.006	-.001	-274.01
	Scalar invariance	5909.08	3468	<.001	.885	.874	.043	.058	186892.80	191.3	52	.000	-.009	-152.88
	Residual invariance	6053.64	3528	<.001	.877	.877	.044	.061	186713.64	144.6	60	.000	-.008	-179.16
	Latent variances	6067.48	3536	<.001	.875	.874	.044	.065	186676.74	13.84	8	.027	-.002	-36.90
	Latent covariances	6113.31	3564	<.001	.876	.877	.048	.065	186542.43	45.83	28	.004	.001	-134.31
	Latent means	6131.58	3572	<.001	.875	.877	.044	.065	186506.87	18.27	8	.007	-.001	-35.56

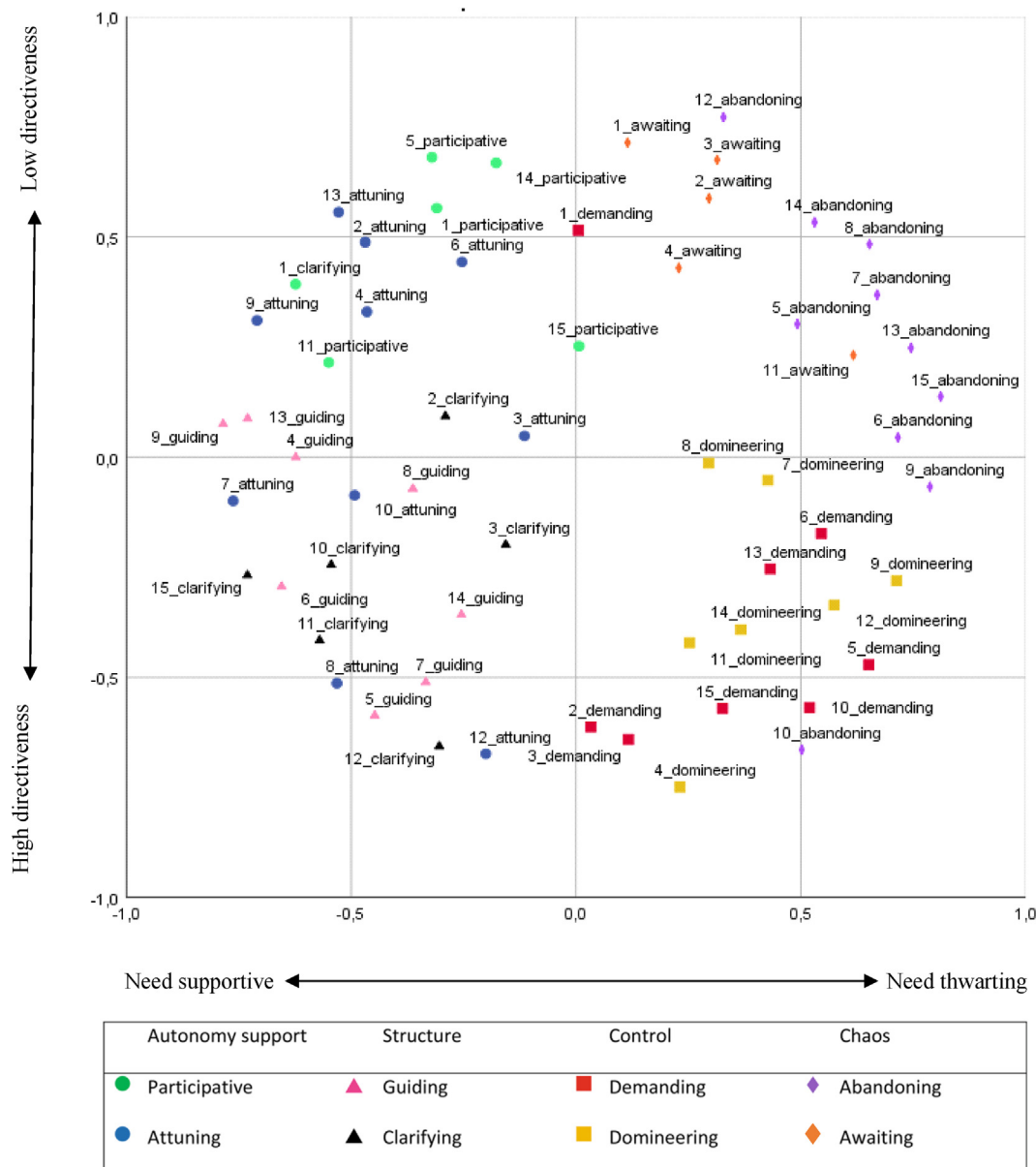


Fig. 2. Two dimensional MDS-representation of the teaching practices of the Situations-in-School Questionnaire.

Table 3
Means, standard deviations, Cronbach alphas, and partial correlations.

Variables	N	M(SD)	α	Social Desirability	Years of Teaching	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.
Basic needs																						
1. Autonomy satisfaction	4	3.76(0.53)	.84	-.02	-.03	–																
2. Competence satisfaction	4	3.65(0.74)	.83	.01	-.04	.37***	–															
3. Relatedness satisfaction	4	3.98(0.65)	.86	.01	.03	.43***	.26***	–														
4. Autonomy frustration	4	3.60(0.71)	.78	-.03	.02	-.38***	-.11**	-.29***	–													
5. Competence frustration	4	2.24(0.64)	.83	.02	.01	-.31***	-.54***	-.23***	.29***	–												
6. Relatedness frustration	4	3.01(0.97)	.81	.01	-.03	-.34***	-.16***	-.49***	.34***	.41***	–											
Teaching styles																						
7. Autonomy support	15	5.05(0.84)	.83	.07*	.05	.18***	.22***	.31***	-.02	-.07	-.07	–										
8. Structure	15	5.49(0.76)	.86	.03	.02	.21***	.33***	.27***	-.03	-.16***	-.12***	.74***	–									
9. Control	15	3.44(0.97)	.84	.06	.01	-.14***	.02	-.13***	.22***	.16***	.18***	-.07*	.03	–								
10. Chaos	15	2.17(0.75)	.83	.04	-.02	-.20***	-.12***	-.18***	.18***	.27***	.25***	-.15***	-.28***	.43***	–							
Subareas																						
11. Participative	5	4.39(1.17)	.70	.08*	.03	.13***	.14***	.22***	-.03	-.03	-.03	.87***	.57***	-.08*	-.06	–						
12. Attuning	10	5.32(0.81)	.78	.08*	.08*	.20***	.25***	.33***	-.01	-.08*	-.08*	.94***	.67***	-.04	-.19***	.67***	–					
13. Guiding	8	5.54(0.79)	.77	.02	.04	.20***	.31***	.26***	-.06	-.15***	-.11**	.71***	.92***	-.01	-.25***	.52***	.71***	–				
14. Clarifying	7	5.44(0.88)	.77	.03	-.01	.20***	.30***	.24***	.01	-.14***	-.11**	.65***	.91***	.07*	-.27***	.52***	.64***	.67***	–			
15. Demanding	8	3.51(0.99)	.70	.06	.01	-.10**	.04	-.09*	.20***	.13***	.14***	-.05	.06	.93***	.36***	-.06	-.03	.01	.11***	–		
16. Domineering	7	3.37(1.09)	.74	.06	-.01	-.16***	-.01	-.15***	.20***	.17***	.19***	-.08*	.01	.92***	.44***	-.09**	-.05	-.02	.02	.72***	–	
17. Abandoning	10	1.92(0.79)	.83	.05	-.01	-.21***	-.15***	-.19***	.16***	.28***	.25***	-.27***	-.36***	.46***	.90***	-.16***	-.30***	-.35***	-.30***	.40***	.46***	–
18. Awaiting	5	2.69(1.08)	.70	.01	-.03	-.11***	-.02	-.09*	.14***	.14***	.14***	.08*	-.07*	.23***	.77***	.12***	.04	.01	-.13***	.16***	.26***	.41***

Note. * = $p < .05$; ** = $p < .01$; *** = $p < .001$.

the variables, partialled out for social desirability and years of teaching. Post-hoc comparisons using a Student t-test showed that (a) autonomy satisfaction was higher than autonomy frustration, $t(948) = 13.82, p < .001$, competence satisfaction was higher than competence frustration, $t(948) = 53.56, p < .001$, relatedness satisfaction was higher than relatedness frustration, $t(948) = 42.58, p < .001$; (b) satisfaction of the need for competence was higher than satisfaction of the needs for relatedness, $t(948) = 13.48, p < .001$, and autonomy, $t(948) = 12.34, p < .001$, whose means did not differ at $p < .001$. Frustration of the need for autonomy was higher than frustration of the needs for competence, $t(948) = 34.66, p < .001$, and relatedness, $t(948) = 35.15, p < .001$, whose means did not differ. For the subareas of the motivating and demotivating teaching styles, all the means differed at $p < .001$. Table 3 shows that guiding, clarifying and attuning were the most frequently adopted, with mean values up to 5. This was followed by the participative subarea with a mean value of 4.39. The demotivating styles were adopted less, and primarily the controlling ones: the mean values were higher than 3 for demanding and domineering and 2.69 and 1.92 respectively for awaiting and abandoning. This suggests that this sample of teachers reported adopting effective motivating behaviors more than the demotivating controlling and chaotic ones.

As shown in Table 3, the three needs satisfaction related to teacher adoption of motivating behaviors, while the three needs frustration related with demotivating behaviors at $p < .001$, thus confirming the external validity of the SIS. In line with the distinction between the bright and dark path, only a few negative correlations were found between (a) need satisfaction and the adoption of demotivating behaviors, mostly the domineering and the abandoning subareas, (b) need frustration and the adoption of guiding and clarifying subareas. No correlation was found for the participative and attuning subareas at $p < .001$.

3.3. Path analysis

The path analysis revealed good fit indices: $\chi^2 = 45.40 (df = 24), p < .01; \chi^2/df = 1.89; CFI = 0.99; TLI = 0.98; RMSEA = 0.03$. The R^2 values ranged from 0.05 to 0.11. Basic psychological need satisfaction explained 11% of the total variance in the clarifying subarea, 11% of the guiding, 1% of the attuning, and 2% of the participative subareas. On the other hand, basic psychological need frustration explained 5% of the total variance in the domineering and demanding subareas, 4% in awaiting, and 10% in abandoning. A more fine-grained examination of the specific relationships between the variables revealed that teachers' satisfaction of the need for autonomy was significantly (but weakly) associated solely with their tendency to be clarifying. Teachers' satisfaction of the needs for competence and relatedness was positively associated with all the motivating subareas.

Teachers' frustration of the need for autonomy was correlated with the demanding, domineering, and awaiting subareas. The frustration of the need for competence was associated with all the demotivating subareas, whereas the frustration of the need for relatedness was associated with the domineering and abandoning subareas (see Fig. 3).

4. Discussion

Knowing more about what can lead teachers to be motivating or demotivating is an essential educational goal that can inform intervention programs. This study focused on teacher need satisfaction/frustration, which previous research has found to relate to the adoption of a motivating or a demotivating style, respectively (Aelterman et al., 2019; Moè & Katz, 2020; 2021). By considering the three needs separately, we aimed to provide a fine-grained analysis of the relationships between the four motivating and four demotivating subareas posited by Aelterman et al. (2019) and

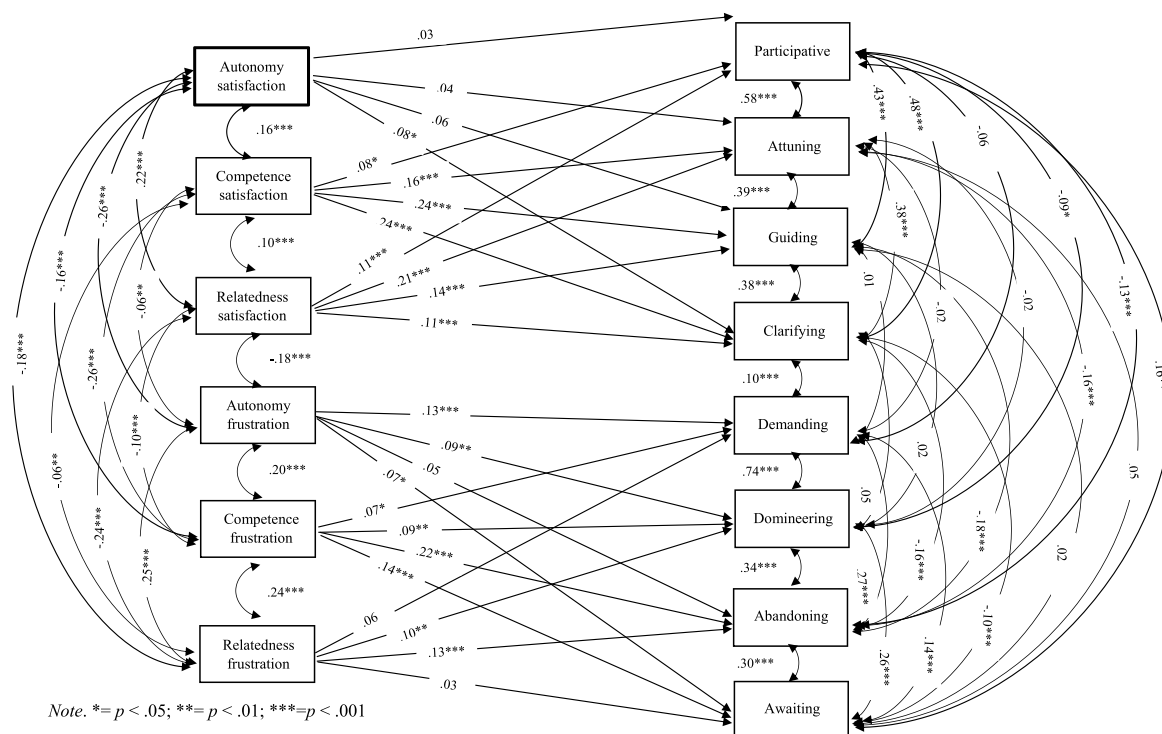


Fig. 3. Results of the path analysis for the relationships among the three basic need satisfaction/frustration and the eight motivating and demotivating subareas.

each of the three basic psychological needs satisfaction and frustration.

The results confirmed the prevalence of motivating over demotivating modalities and greater need satisfaction than frustration, but also pointed to a number of differences between needs and subareas. Specifically, the findings suggested that satisfaction and frustration of each of the three needs was related differently to teachers' reported adoption of specific motivating or demotivating behaviors, thus confirming the importance of investigating a detailed model of these relationships and not only the aggregated scores.

4.1. Teacher adoption of motivating and demotivating styles and need satisfaction/frustration

As predicted, teachers adopted more motivating than demotivating behaviors. Specifically, as hypothesized, and in line with Aelterman et al. (2019), the guiding, clarifying and attuning subareas were the most frequently reported. The chaotic subareas were adopted less often than the controlling ones and the domineering subareas less often than the demanding subareas. The mean values were similar to those found by Aelterman, suggesting consistency across cultures. The only difference was that in the current sample the participative style (4.39) was adopted more often than the demanding style (3.51), unlike in the Aelterman sample (3.54 vs. 4.08).

Need satisfaction was higher than need frustration for each of the needs, as hypothesized. Interestingly there were some differences across needs. In particular, for satisfaction, competence was higher than the other two needs, while for frustration autonomy was higher. This pattern of results may indicate that this sample of teachers was mostly satisfied because they perceived to be competent. The greatest source of frustration was lack of autonomy. Although the mean value (3.60) was lower than those observed for need satisfaction (>3.64), it was higher than the other two needs frustration.

4.2. Satisfaction of the needs for competence and relatedness and frustration of the need for competence play a major role

The Pearson correlations showed that the satisfaction of each of the three needs was positively related to the motivating subareas, while the frustration of each of the needs was related to the demotivating subareas.

A more detailed picture regarding the strength of the relationships between the variables emerged when investigating these associations using path analysis. The satisfaction of the needs for competence and relatedness was associated with the adoption of motivating behaviors. By contrast, only the frustration of the need for competence was strongly associated with the adoption of demotivating behaviors. Although the satisfaction of the need for relatedness was associated with the four motivating subareas, the frustration of this need was only associated with two demotivating subareas (domineering and abandoning). These associations suggest that it is more important to support rather than to avoid frustrating teachers' need for relatedness to enable teachers become more autonomously motivating.

These results extend previous research (Aelterman et al., 2019; Moè & Katz, 2020; 2021) by highlighting the importance of supporting the two needs for competence and relatedness and curbing frustration of the need for competence. Surprisingly, the satisfaction of the need for autonomy, which is generally considered crucial to satisfy (e.g., Chirkov, 2009; Koestner & Holding, 2021), emerged as less critical in this specific context since it was associated only with teachers' adoption of clarifying behaviors. However,

autonomy frustration was associated with increased adoption of demanding, domineering, and awaiting behaviors. This finding suggests that it is important not to frustrate the need for autonomy because it is associated with several demotivating subareas. The results also point to the importance of investigating each need separately, since there may be situations in which more effort should be directed towards helping teachers feel competent and related in the workplace rather than autonomous.

4.3. Educational implications

The results suggest that to favor teacher adoption of a motivating style, special attention should be paid to fostering teachers' satisfaction of their needs for competence and relatedness. This could involve efforts to increase teacher self-efficacy (Clark & Newberry, 2019; Flores, 2015; Moè, 2016b; Moè et al., 2010) or steps to improve the quality of teacher-principal, teacher-student, and teacher-parent relationships.

In particular, the critical role of competence satisfaction and frustration suggests that experiencing self-efficacy (i.e., the perception of being able to meet the challenges of teaching) is key to prompting teachers to be more effective and motivating (Tschannen-Moran & Hoy, 2001; Tschannen-Moran, McMaster, 2009). Hence, to encourage teachers to curtail the tendency to use demotivating behaviors, efforts should be envisioned to diminish teachers' feelings of lack of competence and pressure, as suggested by Reeve (2009; 2016).

There are many ways to increase perceived satisfaction and reduce the frustration of competence (see Ryan & Deci, 2000 for an overview of SDT-based interventions for teachers). One key avenue is to provide opportunities to engage in a mastery experience; for instance, by implementing specific programs such as the ASIP (Autonomy Supportive intervention Program: Cheon et al., 2018). Another approach involves lessening the pressures from below (e.g., dealing with disengaged students) and above (e.g., from the principal or institutions) (Bartholomew et al., 2011; 2014). This could be done by increasing principals' support of teachers (Ford et al., 2019) while providing support to the principals themselves (Chang et al., 2015). Lessening the focus on performance by preferring mastery goals could also help teachers (and students) feel more competent (Cuevas et al., 2018).

Crucially, the three needs are interrelated (e.g., Ryan & Deci, 2017; 2020). This implies that favoring autonomy and relatedness is likely to be reflected in the greater adoption of a motivating teaching style. Ryan and Deci (2000) pointed out that creating a caring environment is the first step toward enhancing motivation. In this environment, people can be scaffolded to experience competence and feel freer to make autonomous decisions. This suggests that perceiving the need for competence as satisfied and not frustrated implies a supportive, nurturing and warm work climate that contributes to greater perceived autonomy. School psychologists and principals could implement these principles, by taking steps to favor teacher and student well-being and autonomous motivation.

4.4. Limitations and future avenues

This study was correlational and based solely on self-reports. While this is the standard way of assessing motivating and demotivating teaching styles, future studies could include other measures, such as observations by external researchers and reports by students who rate perceived teachers' adoption of each style. Second, in line with Aelterman et al. (2019), the sample was composed of middle and secondary school teachers. Future research could address these styles at the university level (as done by Vermote

et al., 2020) as well as in primary school teachers. Third, this study was cross-sectional. Longitudinal studies could shed more light on the reciprocal relationships among the styles and their respective subareas and need satisfaction/frustration over time. Fourth, most of the relationships between need satisfaction/frustration and adoption of motivating and demotivating subareas were small. The largest ones involved the need for competence (.24 and .22 regression indices; see Fig. 3). This would suggest that there are potential mediators or moderators or other factors related to the adoption of a motivating or a demotivating style beyond need satisfaction/frustration. Previous research has examined teacher autonomous motivation (Abós et al., 2018), teacher burnout (Catalán et al., 2018; Moè & Katz, 2020), entity/incremental beliefs (Vermote et al., 2020), and teacher self-compassion (Moè & Katz, 2020) separately. Future research could (a) consider other factors such as attributional styles, personality factors, performance/mastery goals, contextual pressures, cultural determinants and (b) include at least some of them in a longitudinal study to assess the interplay with need satisfaction/frustration over time. Fifth, we followed previous SDT studies that view need satisfaction and need frustration as distinct constructs with specific antecedents and outcomes (Bartholomew et al., 2011, 2018; Vansteenkiste & Ryan, 2013). We investigated which costs were associated with basic-psychological need frustration and which benefits were related to basic-psychological need satisfaction (Vansteenkiste et al., 2020). Future studies could further assess the cross relations between the paths; namely, the protective power of need satisfaction over teachers' tendency to use demotivating subareas and the cost of need frustration, to potentially reduce the likelihood of teachers' adoption of the motivating subareas. Sixth, the data for this study were collected at three different time points, before and during the COVID pandemic. Although only a few mean differences were found between the datasets, the findings should be treated with caution since the COVID pandemic and online teaching may have

impacted teacher styles and need satisfaction/frustration. Future studies could investigate these changes in more depth.

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Declaration of competing interest

The authors declare that they have no conflict of interest.

Appendix

Instructions

Please report, in the third column, the extent to which each of the possible ways to manage the situation describes what you have done in the past [Indichi in terza colonna quanto ognuno dei possibili comportamenti per gestire la situazione descrive ciò che ha fatto in passato].

Scoring

1 = not at all; 2 = very little; 3 = little; 4 = enough; 5 = a lot; 6 = very much; 7 = completely.

[1 = per niente; 2 = pochissimo; 3 = poco; 4 = abbastanza; 5 = molto; 6 = moltissimo; 7 = del tutto].

	Subareas	Standardized coefficients (λ_x)
<i>1. You are thinking about classroom rules. So, you: [Per fare rispettare le regole]</i>		
1.1. Announce your expectations and standards for being a cooperative classmate. [Espone le sue aspettative e i suoi standard per cooperare efficacemente]	Clarifying	.53
1.2. Don't worry too much about the rules and regulations. [Non si preoccupa più di tanto delle regole e dei regolamenti]	Awaiting	.44
1.3. Post your rules. Tell students they have to follow all the rules. Post the sanctions for disobeying the rules. [Fa un tabellone che riporta le regole da seguire e specifica le sanzioni per i trasgressori]	Demanding	.11
1.4. Invite students to suggest a set of guidelines that will help them to feel comfortable in class. [Invita gli studenti a suggerire delle linee guida che li aiutino a sentirsi bene in classe]	Participative	.51
<i>2. As you prepare for class, you create a lesson plan. Your top priority would be to: [Nel programmare una lezione dà la priorità a]</i>		
2.1. Communicate which learning goals you expect students to accomplish by the end of the lesson. [Comunicare gli obiettivi di apprendimento che si aspetta gli studenti raggiungano al termine della lezione]	Clarifying	.50
2.2. Don't plan or organize too much. The lesson will unfold itself. [Non pianifica o organizza particolarmente. La lezione si svilupperà spontaneamente]	Awaiting	.40
2.3 Offer a very interesting, highly engaging lesson. [Proporre una lezione molto interessante e coinvolgente]	Attuning	.46
2.4. Insist that students have to finish all their required work - no exceptions, no excuses [Fare in modo che gli studenti facciano ciò che è loro richiesto, senza eccezioni né scuse]	Demanding	.36
<i>3. The class period begins. You: [Inizio delle lezioni]</i>		
3.1. Provide a clear, step-by-step schedule and overview for the class period. [Fornisce un elenco chiaro e dettagliato passo dopo passo e una panoramica di tutto il periodo di lezione]	Clarifying	.42
3.2. Don't plan too much. Instead, take things as they come. [Non pianifica troppo. Piuttosto prende le cose come vengono]	Awaiting	.43
3.3. Insist firmly that students must learn what they are taught -your duty is to teach, their duty is to learn. [Mette in chiaro che gli studenti devono applicarsi: il suo dovere è quello di insegnare e il loro dovere è quello di imparare]	Demanding	.46
3.4. Ask students what they are interested to know about the learning topic. [Chiede agli studenti ciò che più interessa loro sapere degli argomenti da imparare]	Attuning	.44
<i>4. You would like to motivate students during class. You decide to: [Per motivare gli studenti]</i>		
4.1. Minimize the lesson plan; let what happens happen in the lesson. [Riduce il carico delle lezioni; lascia che le cose vadano come devono andare]	Awaiting	.40
4.2. Pound the desk and say loudly: "Now it is time to pay attention!" [Le capita di battere le mani sulla cattedra ed esclamare: "Fate Domineering attenzione !"]	Domineering	.38

(continued on next page)

(continued)

4.3. Offer help and guidance [Offre aiuto e orienta nelle scelte]	Guiding	.57
4.4. Identify what the personal benefits of the learning material are for students' everyday life. [Invita a cogliere le relazioni fra il materiale di studio e la vita quotidiana dello studente]	Attuning	.50
5. You ask your students a challenging, but doable question to involve them in the lesson. However, as during the previous lesson, you get only silence, as no student answers your question. You: [Cerca di rendere la lezione interattiva, facendo domande, ma nessuno risponde, allora]		
5.1. Name a student and you oblige that student to answer your question. [Chiama uno studente e lo obbliga a rispondere]	Demanding	.41
5.2. Clarify and reframe the question so that students can answer it. [Chiarisce e riformula la domanda così che gli studenti possano rispondere]	Guiding	.58
5.3. Ask students to discuss the question with their neighbor and then invite them to share their answer within their groups. [Chiede agli studenti di discutere la domanda con il compagno di banco e poi li invita a condividere la risposta a piccoli gruppi]	Participative	.51
5.4. Sigh. Just give the answer yourself and move on. [Pazienza! Dà la risposta e prosegue la lezione]	Abandoning	.44
6. At a difficult point in the lesson, students begin to complain. In response, you: [Una parte di lezione risulta difficile agli studenti che si lamentano]		
6.1. Accept their negative feelings as okay. Assure them that you are open to their input and suggestions. [Riconosce le loro difficoltà come normali e li invita ad esprimere i loro sentimenti e ad avanzare idee e suggerimenti]	Attuning	.47
6.2. Insist they pay attention. They must learn this material for their own good. [Insiste che devono stare attenti: è nel loro interesse imparare bene l'argomento]	Demanding	.63
6.3. Show and teach them a helpful strategy for how to break down the problem to solve it step-by-step. [Mostra e insegna loro una strategia efficace per suddividere il materiale in più parti da risolvere passo a passo]	Guiding	.64
6.4. Just ignore the whining and complaining. They need to learn to get over the obstacles themselves. [Semplicemente ignora le lamentele e le proteste: devono imparare a superare da soli gli ostacoli]	Abandoning	.66
7. You present a difficult lesson that requires a lot of effort from the students. In doing so, you: [Tiene una lezione difficile che richiede molto impegno agli studenti]		
7.1. Don't be too concerned, as students need to figure out for themselves how much effort to put forth. [Non si preoccupa particolarmente: gli studenti devono capire da sé quanto impegno è richiesto]	Abandoning	.66
7.2. Try to find ways to make the lesson more interesting and enjoyable for the students. [Cerca di trovare un modo per rendere la lezione più interessante e piacevole per gli studenti]	Attuning	.56
7.3. Insist firmly that "Now is the time for hard work!" [Esordisce dicendo che è arrivato il momento di applicarsi con maggiore impegno]	Domineering	.54
7.4. Say, "Because this lesson is extra difficult, I will provide you with extra help and extra assistance, if needed." [Dice: "Poiché questa è una lezione più difficile, vi fornirò più aiuto e supporto, se ne avrete bisogno"]	Guiding	.50
8. During a class assignment, you notice that some students are showing signs of anxiety. Sensing that anxiety, you: [Durante una verifica, nota che alcuni studenti sono ansiosi]		
8.1. Acknowledge that they look anxious and stressed. Invite them to voice their sense of unease. [Riconosce che sembrano ansiosi e sotto pressione. Li invita, perciò, ad esprimere il disagio che stanno provando]	Attuning	.58
8.2. Insist that they must act in a more mature way. [Li esorta a comportarsi in modo più maturo]	Domineering	.53
8.3. Break down the steps needed to handle the assigned task so that they will feel more capable of mastering it. [Suddivide il compito in più parti per renderlo più fattibile così che gli studenti si sentano maggiormente in grado di affrontarlo]	Guiding	.50
8.4. Don't worry about it—let it pass on its own. [Non se ne preoccupa, lascia che passi]	Abandoning	.61
9. One learning activity ends and you are about to make the transition to a new learning activity. You: [Sta per passare ad una nuova attività]		
9.1. Command the students to hurry up and to finish the old activity. [Dice agli studenti di sbrigarsi a finire la precedente attività]	Domineering	.51
9.2. Monitor how well each student is ready and able to make the transition to the new activity. [Verifica che gli studenti siano pronti e sappiano affrontare la nuova attività o il nuovo argomento]	Guiding	.69
9.3. Just start the new activity—maybe some students will	Abandoning	.64
seguiranno]		
9.4. Be patient; confirm that those who are still working hard may have the time they need to finish up. [Mostra pazienza: consente a chi ancora sta lavorando con impegno di avere il tempo per finire]	Attuning	.58
10. A couple of students have been rude and disruptive. To cope, you: [Degli studenti disturbano]		
10.1. Command that they get back on task immediately; otherwise there will be bad consequences. [Li esorta a calmarsi e a stare attenti, minacciando di punirli]	Demanding	.53
10.2. Explain the reasons why you want them to behave properly. Later talk to them individually; you listen carefully to how they see things. [Spiega i motivi per cui chiede che si comportino correttamente. Successivamente parla con loro individualmente cercando di cogliere il loro punto di vista]	Attuning	.64
10.3. Communicate the classroom expectations for cooperation and prosocial skill. [Rende chiare le aspettative per una cooperazione proficua in classe]	Clarifying	.69
10.4. Let it go, because it is too much of a pain to intervene. [Lascia perdere: è troppo faticoso ed emotivamente impegnativo intervenire]	Abandoning	.59
11. It is time for students to practice what they have learned. You: [Propone di applicare ciò che hanno imparato]		
11.1. Ask students what types of problems they would like to work on [Chiede agli studenti a quali tipi di problemi piacerebbe loro lavorare]	Participative	.60
11.2. Demand that now is the time to work, whether they like it or not. Tell them that they sometimes need to learn to do things against their will. [Rende chiaro che adesso è il momento di lavorare, che piaccia o no: a volte bisogna imparare a fare delle cose anche contro la propria volontà]	Domineering	.58
11.3. Not to plan too much and see how things evolve. [C'è troppo da pianificare e preferisce stare a vedere come le cose evolvono]	Awaiting	.80
11.4. Explain the solution to one problem step-by-step, then guide their progress and improvement on the follow-up problems. [Spiega dettagliatamente la soluzione a un problema e accompagna nello svolgimento dei successivi, sostenendo gli sforzi e i progressi]	Clarifying	.60
12. As the class ends, it comes to your attention that two students are arguing and offending each other. As the rest of the students leave the classroom, you ask the two students to remain so that you can [Due studenti litigano in classe. Al termine della lezione, quando i compagni sono usciti]		
12.1. Take the arguing students aside: describe briefly what you saw and ask for their view and suggestions about what to do. [Li prende in disparte: descrive brevemente ciò che hai visto e chiede loro un'opinione e suggerimenti su cosa fare]	Attuning	.45
12.2. Be clear about what the classroom guidelines and expectations are. Indicate what helpful, cooperative behaviour is. [Esprime con chiarezza quali sono le direttive e le aspettative per una buona convivenza. Spiega in cosa consiste un comportamento cooperativo e di aiuto]	Clarifying	.55

(continued)

12.3. Don't intervene, just let students resolve things for themselves. [Non intervieni: lascia che gli studenti risolvano le cose da soli]	Abandoning	.54
12.4. Tell them they should be ashamed of their behavior and that, if they continue, there will be sanctions [Dice loro che dovrebbero vergognarsi di come si sono comportati e che, se dovesse ripetersi, saranno presi dei provvedimenti disciplinari]	Domineering	.58
13. You have finished scoring a test. Several students scored low again, even though you paid extra attention to this material last week. You: [Ha appena concluso di correggere le verifiche e scopre che, nonostante si sia soffermato a lungo sull'argomento, troppi studenti sono ancora insufficienti]		
13.1. Insist that low scores are unacceptable to you. Tell students that they must score higher for their own good. [Dice loro che voti così bassi sono inaccettabili: devono fare meglio per il loro bene]	Demanding	.67
13.2. You help students revise their wrong answers so they understand what went wrong and how to improve. [Aiuta gli studenti a rivedere le risposte sbagliate affinché capiscano cosa è andato storto e come si può migliorare]	Guiding	.62
13.3. Listen with patience and understanding to what the students say about the test performance. [Ascolta con pazienza e comprensione ciò che ne pensano gli studenti dell'esito della verifica]	Attuning	.55
13.4. Don't spend class time on the low scoring students. [Non spreca le poche ore di lezione che ha per preoccuparsi degli studenti che prendono brutti voti]	Abandoning	.62
14. One or more students need remediation because they repeatedly failed for your subject. You: [Alcuni studenti devono recuperare un brutto voto]		
14.1. Insist: "Try harder. Get it right. Be serious. Otherwise there will be bad consequences." [Rende chiaro che devono impegnarsi di più e con serietà per fare meglio, altrimenti ci saranno conseguenze negative]	Domineering	.61
14.2. Re-explain the learning material step-by-step until they have mastered it better. [Rispegia la lezione passo dopo passo fino a quando non saranno in grado di padroneggiare meglio i contenuti]	Guiding	.46
14.3. Say: "Okay, where might we start; any suggestions?" [Dice loro: "Ok, da dove potremmo iniziare? Suggerimenti?"]	Participative	.53
14.4. Don't intervene but wait until they ask for additional support themselves. [Non intervieni, ma aspetta che siano loro a chiedere un aiuto ulteriore]	Abandoning	.58
15. When assigning homework you: [Quando assegna i compiti per casa]		
15.1. Make it clear that the homework has to be done well; if not, bad consequences will follow. [Mette in chiaro che i compiti devono essere fatti bene; in caso contrario, ci saranno conseguenze negative]	Demanding	.58
15.2. Communicate what it involves to competently do the homework. Check that everyone understands what is required to successfully accomplish the homework. [Spiega bene cosa è richiesto di fare. Verifica che tutti abbiano capito cosa fare e come]	Clarifying	.58
15.3. Offer a number of different homework exercises (e.g., three) and you ask students to pick a few of them (e.g., two). [Propone diversi esercizi (ad es. 3) e chiede di svolgerne alcuni (ad es. 2)]	Participative	.65
15.4. Let the homework speak for itself rather than over-explaining everything. [Pensa che è già tutto chiaro: il compito parla da sé e non serve 'spiegarlo']	Abandoning	.52

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