VALIDATION OF A TEACHER SELF-EFFICACY SCALE IN ITALIAN AND RELATIONS WITH RELATIONSHIP WITH COLLEAGUES, SCHOOL LEADERSHIP, SCHOOL INNOVATIVENESS, TEACHER AUTONOMY, ROLE CLARITY, AND ROLE CONFLICTS

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The purpose of the study was to validate in the Swiss-Italian context an instrument to measure teacher self-efficacy. Participants were 676 Swiss teachers in pre-primary, primary, lower secondary, upper secondary, and vocational schools. Overall, results indicated that the Italian version of the Teacher Self-Efficacy Scale is a valid measure, also useful to investigate gender and, with some caution, school-sector differences. Moreover, teacher self-efficacy significantly correlated with relationships with colleagues and school leadership, indicating criterion validity, with teachers' innovation and autonomy, role clarity, and role conflicts. In order to increase knowledge about poorly studied relations, a model including all constructs under investigation was also tested. Findings suggest that especially general teaching autonomy, role clarity, and school innovativeness directly foster teacher self-efficacy.

Keywords: Teacher self-efficacy; Teacher autonomy; Social support, School innovativeness; Role clarity.

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Over the past 40 years, teachers' self-efficacy has been the subject of a growing number of studies (Zee & Koomen, 2016) that have related it to various positive outcomes regarding teachers' work life. For instance, it has been shown that self-efficacy increases persistence in working with challenging students and affects teachers' commitment, enthusiasm, practices, teaching behaviors, and teaching effectiveness (Chesnut & Burley, 2015; Klassen & Tze, 2014; Skaalvik & Skaalvik, 2007). Furthermore, self-efficacy has been associated with indicators of well-being, such as teacher job satisfaction (positively), stress, and burnout (negatively) (Caprara et al., 2006; Malinen & Savoilanen, 2016; Schwarzer & Hallum, 2008; Skaalvik & Skaalvik, 2007, 2010, 2014, 2016). Furthermore, in Lent and Brown's (2006, 2008) social cognitive model, self-efficacy is considered among the sources of job and life satisfaction. These results are consistent with the social cognitive theory (Bandura, 1977, 1997) postulates, from which the self-efficacy construct stems — the beliefs people have about themselves are crucial for the exercise of control and personal agency. Hence, teacher self-efficacy appears as an important aspect to consider when studying teachers' job-related motivation, behavior, and satisfaction.

Schwarzer and colleagues (1999) developed a brief scale composed of 10 items, the Teacher Self-Efficacy Scale, to assess teacher self-efficacy. This scale was developed in German and assesses teachers' self-efficacy by including items exploring several important dimensions of teachers' daily work, such as

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social interaction with students, parents, and colleagues, but also more general work-related dimensions such as job accomplishment, skill development on the job, and coping with work-related stress. To our knowledge, no version of this scale has been validated in the Italian language, despite the good psychometric properties and a length that allows easy integration into larger questionnaires and fostering higher response rates to surveys. Indeed, short measures have been proved to be useful, precise, and valid measures of psychological constructs (Schipolowski et al., 2014).

For this reason, this study aimed to validate, in the Swiss-Italian context, the 10-item self-report scale proposed by Schwarzer and colleagues (1999) to measure teacher self-efficacy. In a first step, the soundness of the items used to measure the latent construct was evaluated. In a second step, the internal consistency and invariance of this scale between genders and across school grades were assessed. Hence, in a third step, criterion validity was investigated by correlating self-efficacy with teachers' perception of the quality of the relationship with colleagues and of positive school leadership. In a fourth step, to expand knowledge about these relations, we explored the association of self-efficacy with innovativeness of the school, teacher autonomy, role clarity, and role conflicts, and finally, a structural equation model (SEM) was tested including all the considered variables.

The Teacher Self-Efficacy Scale

According to Bandura's (1977, 1997) social cognitive theory, teacher self-efficacy can be defined as the individual teacher's beliefs in his/her own ability to plan, organize, and implement activities that are typical of this profession and essential to attain the given educational goals. The Teacher Self-Efficacy Scale developed by Schwarzer et al. (1999) that we chose to validate includes four major areas, which are essential to successfully teach: job accomplishment, skill development on the job, social interaction with students, parents, and colleagues, and coping with work-related stress. For these areas, the authors initially developed 27 items following Bandura's (1997, 2006) recommendations for item construction. Items are rated using a 4-point Likert scale, with responses ranging from 1 (*not at all true*) to 4 (*exactly true*). The pool of 27 items was administered three times to a sample of approximately 300 German teachers. The authors aimed to develop an instrument of about 10 items to assess teacher's perceived self-efficacy within the above-mentioned areas. The final version of the scale had good psychometric properties. Furthermore, evidence of discriminant validity with general self-efficacy and other personal attitudes have also been highlighted. Since its validation, the scale has been widely used. Hence, this scale can be considered a valid and reliable measure of teacher self-efficacy. Our analysis aimed to confirm or refute the reliability of an Italian version of this scale.

Relationship with Colleagues

Previous studies showed that interpersonal relationships play an important role in teachers' work (Van Droogenbroeck et al., 2014) and that positive and satisfying relationships with colleagues moderate work-related stress and discomfort (Gavish & Friedman, 2010). Consistently, the negative impact of professional isolation on teacher retention and attrition has been confirmed (Buchanan et al., 2013). Good relationships among teachers that foster collaboration, communication, and camaraderie are also important to enhance student learning and achievement (Conner, 2014; Johnson et al., 2012). Teacher self-efficacy might be the mediator of the link between good colleagues' relationships and student learning and achievement.

Indeed, teacher self-efficacy has been found to be associated with trusting relationships with colleagues in primary school teachers (Huang et al., 2019) and to grow in novice teachers experiencing support from colleagues (Beasley et al., 2013; Chester & Beaudin, 1996; Chong & Kong, 2012; Darling-Hammond & Bransford, 2005; Hoy & Spero, 2005; Ingersoll, 2012; Kelly & Northrop, 2015). The study by Devos and colleagues (2012) conducted on 110 early-career teachers showed, however, that collaborative interactions with colleagues foster self-efficacy only if teachers are experiencing difficulties or work in a mastery-oriented school. School climate and culture might then influence the perceived availability of support as well as the impact that such support has on teacher self-efficacy. In this study, we investigated the association between the teacher's self-efficacy and his/her perception of a good relationship with fellow teachers, which enables peaceful work in a collaborative environment.

School Leadership

In previous studies, employees' perception of support from supervisors (and colleagues) was associated with an improvement in their self-efficacy and professional commitment (Chou, 2015; Massenberg et al., 2015). Likewise, in studies conducted at school, the support from administrative leadership predicted the self-efficacy and professional commitment of teachers (Buchanan et al., 2013; Tickle et al., 2011). Indeed, school principals who support teachers, are responsive to their needs, and give them autonomy, foster their self-efficacy (Hoy & Woolfolk, 1993; Ross, 1998; Scott, 2011). In this case as well, it is not a matter of quantity but of quality of the relationship itself, of the meetings, and of the mentoring and helping activities performed (Devos et al., 2012; Hoy & Woolfolk, 1993). In this study, we investigated the relationship between teachers' self-efficacy and their perception of school leadership.

School leadership affects not only the relationship with teachers directly and, thus, teacher self-efficacy indirectly, but also school climate and culture and the perception that teachers have of them. The degree of innovativeness of the school should thus be strongly affected by the school leadership style.

School Innovativeness

This variable allows, although indirectly, to investigate a specific aspect related to the attitude of the school principal (the degree of innovation promoted in the school) and its effects on teachers' self-efficacy. The degree of organizational vitality and the propensity or incentive to innovate in a company has been associated to employees' motivation, commitment, and work efficiency (Majer & D'Amato, 2005). The perception of innovativeness of the school has been integrated into organizational climate studies, however, those studies did not pay specific attention to the dimension of school climate and its association with teacher self-efficacy. Indeed, little is known about the "cultural" characteristics of the school that might influence teacher self-efficacy. Hence, we decided to include this variable and test its association with self-efficacy.

Teacher Autonomy

According to Deci and Ryan (1985; 2000), together with competence (i.e., perceived self-efficacy, mastery perception) and relatedness (i.e., good and supportive relationships), autonomy is one of the three fundamental human needs. People need to feel that they have at least some control over their destiny and

lives, and, most importantly, behavior. For teachers' work in the classroom, having autonomy means being able to choose what, how, and with what goals to teach, to decide about time devolved to teaching contents, to determine standards for students' behavior in the classroom, and to autonomously solve problems (Pearson & Hall, 1993; Pearson & Moomaw, 2006). This means that teachers can make decisions following their personal educational beliefs and values (Deci & Ryan, 2000). Indeed, a certain degree of autonomy is also indispensable for teachers to deal immediately and adequately with unexpected situations.

Despite autonomy being indispensable to foster self-efficacy, the association between teacher autonomy and self-efficacy has hardly ever been studied. Skaalvik and Skaalvik (2014) found a significant and positive correlation of .22 in a sample of 2569 Norwegian teachers in elementary and middle school; De Neve et al. (2015) found a correlation of .26 and self-efficacy partially mediating the effect of autonomy on self-reported changes in differentiated instruction practices in 227 primary school early career teachers. However, a larger body of research has shown that teacher autonomy is positively related to aspects that are strongly related to self-efficacy, such as teachers' learning (Pearson & Moomaw, 2005; Porter, 1989) and their performance (Bakker & Bal, 2010). Moreover, teacher autonomy might also buffer the impact of job demands on teachers' performance (Bakker & Demerouti, 2007; Kwakman, 2001).

Hence, the study of the association between teacher autonomy and self-efficacy may bring additional knowledge about the relationship between these two central constructs, which also represent two fundamental needs for teachers' professional well-being. For this study, we considered the association of teacher self-efficacy with two dimensions of autonomy separately. Autonomy with respect to the curriculum refers to the autonomy to choose the contents, the targeted competences, and teaching objectives as well as the materials used (basically, "what" to teach). General autonomy with respect to teaching refers to autonomy toward the didactic and pedagogical approach, the activities proposed and their length, the types of assessment used, and the management of the classroom space (basically, "how" to teach).

Role Clarity and Role Conflict

Role ambiguity was defined in the '60 by Kahn and colleagues (1964) as a lack of clear communication about the single or multiple roles of a worker, in terms of expected behaviors or performance levels, and then in the early '80 as the degree to which clear information is lacking about role expectations, methods of fulfilling a role, and/or the consequences of role performance (Van Sell et al., 1981). In contrast, role clarity has been more recently defined by Danielsen et al. (2014) as "the degree to which individuals feel they have clear guidance and available information about expected roles and behaviors associated with their job" (p. 260). Finally, role conflict may arise when workers are routinely placed in situations that make them feel conflicted. For instance, an employee may feel conflicted because his/her job requires him/her to do things that are opposed to his/her personal standards or values or because the supervisor gives him/her an order that is inconsistent with what others have told him/her, or with company policies (Bowling et al., 2017).

Considerable attention has been paid to role ambiguity/clarity and role conflict — variables collectively referred to as "work stressors" by organizational researchers, and to their relationship with employee perception of workload, health, job attitudes, and behavior (Bowling et al., 2015, 2017). Some of these studies also involved teachers (Koustelios & Kousteliou, 1998; Koustelios et al., 2004; Papastylianou et al., 2009). However, the association between, respectively, role clarity and role conflict with self-efficacy has been little studied among teachers, which is why we decided to test them in the present study.

Aims of the Study

The first aim of this study was to validate the Italian version of the Teacher Self-Efficacy Scale by assessing its structure and internal consistency. To determine whether different norms should be considered for males and females, as well as for teachers working in different school sectors, measurement invariance across gender and school sectors was also assessed. To test for criterion validity, the study analyzed the relationship between teacher self-efficacy, the quality of the relationship with colleagues, and of positive school leadership. Based on the results of previous studies, we expected a positive association of teacher self-efficacy with all the constructs investigated.

Finally, in order to expand knowledge about poorly studied relations, the associations of teacher self-efficacy with school innovativeness, teacher autonomy, role clarity, and role conflicts were studied. We expected a positive relation between self-efficacy and, respectively, school innovativeness, teacher autonomy, and role clarity, and a negative relation with role conflicts. Moreover, we tested a model including all the variables considered in this study. To model the relationships between the constructs, we relied on both Karasek's (1998) and Lent and Brown's (2006, 2008) theories and empirical findings from previous research. Hence, in the model, (1) school leadership was set as an antecedent of good relationships with colleagues (Chiniara & Bentein, 2018), school innovativeness (De Jong & Den Hartog, 2007; Mumford et al., 2002; Stollberger et al., 2019), teacher curriculum and general teaching autonomy (Chiniara & Bentein, 2016), role clarity, and role conflicts (Den Hartog, 2015; Nandal & Krishnan, 2000; Vullinghs et al., 2020); (2) the quality of the relationship with colleagues was set as an antecedent of school innovativeness (González-Romá, 2008; Stollberger et al., 2019) and role clarity (Mukherjee & Malhotra, 2006); (3) autonomy toward the curriculum and general teaching are influenced by role clarity (Wong et al., 2020) and have an effect on the perceived degree of school innovativeness (Jin & Kim, 2015); and (4) all variables directly affect self-efficacy (Buchanan et al., 2013; De Neve et al., 2015; Huang et al., 2019; Majer & D'Amato, 2005; Raub et al., 2021; Stollberger et al., 2019; Tickle et al., 2011).

Method

Participants and Procedure

The data collection involved 676 teachers working in the Canton Ticino, which is the only State in the Swiss confederation where Italian is the official spoken language. Canton Ticino borders Italy and has 353,343 inhabitants. Females teachers involved in the study were 53.6%, males 40.8%; 5.6% did not provide this information. Most participants had a percentage of working time that was equal to or above 50% of a full-time contract (85.8%). Participants' mean age was of 44.53 years (SD = 10.27). The teachers involved worked in pre-primary and primary school (17.9%), lower secondary school (17.4%), upper secondary school (26.9%), and vocational school (32.2%); 5.6% of participants did not provide this information. Invitation to participate in the survey was extended through a letter sent by the Department of Education, Culture and Sport of Canton Ticino to all teachers working in the Canton public schools. The administration of the questionnaires was conducted through an online platform. The research complied with the ethical rules of the Swiss Society of Psychology.

Measures

Teacher self-efficacy. The Teacher Self-Efficacy Scale, developed by Schwarzer and colleagues (1999), includes 10 items exploring four areas of a teacher's job: job accomplishment, skill development on the

job, social interaction with students, parents, and colleagues, and coping with work-related stress. Items are rated using a 4-point Likert scale, with responses ranging from 1 (*not at all true*) to 4 (*exactly true*). Cronbach's alpha of the original scale validated on three groups of German teachers ranged between .76, and .82.

Quality of relations with colleagues. To evaluate the perceived quality of the relationships with colleagues, four ad-hoc items were included. Participants responded on a 4-point Likert scale (from 1 = *not at all agree* to 4 = *totally agree*). Two sample items are: "The exchange of information between colleagues is good" and "In general, I am satisfied with the relationship with colleagues."

School leadership. To evaluate the perceived positive attitude of school principals, nine items created ad hoc were included, scored by the teachers on a 4-point Likert scale (from 1 = *not at all agree* to 4 = *totally agree*). Two sample items are: "The school principal expresses appreciation for the work I do" and "In case of conflicts between colleagues I can contact the school principal."

Innovativeness of the school. In order to measure the degree of school innovation perceived by the teacher, four items from the Majer-D'Amato Organizational Questionnaire (M_DOQ10; Majer & D'Amato, 2005) were adapted. These items are scored on a 5-point Likert scale (from 1 = *false* to 5 = *true*). Two sample items are: "In my school, the emphasis is on doing things differently" and "In my school, innovative and original ideas are encouraged."

Teacher autonomy. A translation of the Teaching Autonomy Scale (TAS; Pearson & Hall, 1993) was conducted to measure the degree of autonomy perceived by the teacher. This scale has two dimensions, autonomy concerning the curriculum and general autonomy concerning teaching. They are measured by 18 items, six for autonomy toward the curriculum and 12 for autonomy toward the teaching, scored on a 4-point Likert scale (from 1 = *definitely false* to 4 = *definitely true*). Two sample items are: "The contents and competences that are taught in my class are those that I select myself" and "The selection of student learning activities in my class is under my control."

Role clarity. To assess the clarity of the role, two items were created ad hoc. Participants indicated their degree of agreement with the statements proposed on a 7-point Likert scale (from 1 = *completely disagree* to 7 = *completely agree*). A sample item is: "I know exactly what my responsibilities are."

Role conflict. To assess the presence of role conflicts, three items were created ad hoc. The degree of agreement with the statements proposed is assessed on a 7-point Likert scale (from 1 = *completely disagree* to 7 = *completely agree*). A sample item is: "I am confronted with contradictory work demands."

Translation

To validate the Teacher Self-Efficacy Scale developed by Schwarzer et al. (1999), the authors of this paper — two native Italian-speaking educational researchers — translated the German items into Italian. Back translation was then performed by a bilingual professional translator and by a German-speaking native researcher. The two versions were then compared and items in Italian were amended when necessary. The items in Italian are available upon request from the authors.

Data Analyses

To validate the Teacher Self-Efficacy Scale different analyses were made. Means and standard deviations were computed for each item, and Cronbach's alpha was computed to assess the internal consistency. A confirmatory factor analysis (CFA) was performed. To assess the adequateness of the measurement model

we considered different fit indexes: the comparative fit index (CFI) and the Tucker-Lewis index (TLI), which indicate good fit when values are approximately .90 or above (Medsker et al., 1994); the root-mean-square error of approximation (RMSEA) and the standardized root-mean-square residual (SRMR) values, which are indicators of good fit when they are below .05, although RMSEA and SRMR values of approximately .08 or less are also acceptable (Byrne, 2010). Then, using multiple-group CFAs, we tested gender and school grade invariance in order to ascertain whether different norms should be considered for female and male teachers and teachers of different school contexts. As recommended by Chen (2007), the assumption of invariance across models was considered tenable if $\Delta CFI < .01$ and $\Delta RMSEA < .015$. Cronbach's alpha was then computed for each group. Next, correlations between the variables considered in this study were computed. Finally, an SEM model was tested. All variables aside from curriculum and general autonomy were set as latent variables and item responses were taken as indicators. We used the mean of the items of curriculum and general autonomy to include these constructs. The fit indexes used to assess the adequateness of the SEM model were the same considered for CFA. CFA and SEM were performed using AMOS software.

Results

The first aim of the study was to assess the adequateness of items of the Italian version of the Teacher Self-Efficacy Scale to measure the teacher self-efficacy latent factor. A first positive clue was given by Cronbach's alpha value, which was .86. Then, we performed a CFA with all items loading on the latent variable. Indexes of fit for this model were $\chi^2(35) = 245.66$, $p < .001$; TLI = .87; CFI = .90; SRMR = .05; RMSEA = .10, 90% CI [.09, .11], indicating fit below acceptability. We thus inspected modification indexes and correlated Items 1 and 3, and Items 9 and 10 errors, then, we rerun the model. This second model (see Figure 1) showed an adequate fit, $\chi^2(33) = 119.74$, $p < .001$; TLI = .94; CFI = .96; SRMR = .04; RMSEA = .06, 90% CI [.05, .08]. Item loading values ranged from .46 to .68 confirming the soundness of the items used to measure teacher self-efficacy. The correlation of errors of Item 1 with Item 3 was .30 and of Item 9 with Item 10 was .35. Items error correlations raised doubts about the existence of an even better model that might involve two or three scale dimensions and not just one. Hence, based on the results of a preliminary exploratory factor analysis (EFA), we tested a third model in which Items 1 through 8 loaded on a "standard skills" latent variable and Items 9 and 10 on an "innovation skills" latent variable. Both latent variables loaded on the latent "self-efficacy" variable. This model showed an adequate fit, $\chi^2(34) = 165.84$, $p < .001$; TLI = .92; CFI = .94; SRMR = .04; RMSEA = .08, 90% CI [.07, .09], but worse than that of the second model, on which we therefore performed the subsequent analyses. Item means, standard deviations, and loadings are reported in Table 1.

Second, to assess measurement invariance between male and female teachers, a multiple-group CFA was performed. To conduct this analysis, the sample was split into two groups based on gender (276 males and 362 females). Comparison between models confirmed weak (ΔRMSEA value .001 and ΔCFI value .004) and strong (ΔRMSEA value .000 and ΔCFI value .006) invariance. Cronbach's α was computed for each gender group. It was .87 for female and .84 for male teachers. School grade invariance was also assessed. One hundred twenty-one teachers worked in pre-primary and primary schools, 117 in lower secondary schools, 182 in upper secondary schools, and 218 in vocational schools. Comparison between models confirmed weak invariance (ΔRMSEA and ΔCFI were .003). In this case, strong invariance did not hold (ΔRMSEA was .008 but ΔCFI was .051), but partial strong invariance was reached releasing intercepts of Items 1, 3, 8, 9, and 10 (with ΔRMSEA of .001 and ΔCFI of .009). Cronbach's alphas were computed for each group. It was .90 among pre-primary and primary school teachers, .86 among lower secondary school teachers, .82

among upper secondary school teachers, and .87 among vocational school teachers. The results of the multiple-group CFAs are reported in Table 2.

TABLE 1
Item means and standard deviations and results of confirmatory factor analysis

Item	*M*	*SD*	Item loading
1.	2.91	0.61	.59
2.	3.12	0.56	.61
3.	3.02	0.59	.68
4.	3.14	0.64	.66
5.	3.13	0.61	.65
6.	3.21	0.55	.68
7.	3.29	0.57	.66
8.	2.79	0.81	.51
9.	3.10	0.61	.63
10.	2.88	0.68	.46

Note. M = mean; *SD* = standard deviation.

TABLE 2
Goodness-of-fit statistics for the test of gender and school grade invariance

Invariance	χ^2	*df*	Sig. Δ χ^2/df	RMSEA	ΔRMSEA	CFI	ΔCFI	TLI
Gender								
Configural invariance	157.51	66	–	0.047	–	0.957	–	.941
Weak factorial invariance	174.01	75	0.057	0.046	.001	0.953	.004	.944
Strong factorial invariance	195.68	84	0.010	0.046	.000	0.947	.006	.944
Strict factorial invariance	228.87	98	0.003	0.046	.000	0.938	.009	.943
School grade								
Configural invariance	284.42	132	–	0.043	–	0.931	–	.905
Weak factorial invariance	316.92	159	0.214	0.040	.003	0.928	.003	.919
Strong factorial invariance	456.79	186	0.000	0.048	.008	0.877	.051	.881
Partial strong factorial invariance	349.05	171	0.001	0.041	.001	0.919	.009	.915

Note. The assumption of invariance is tenable if ΔCFI < .01 and ΔRMSEA < .015, as suggested by Chen (2007). *df* = degrees of freedom; RMSEA = root-mean-square error of approximation; CFI = comparative fit index; TLI = Tucker-Lewis index.

Third, the relation between self-efficacy and the other constructs considered was analyzed. Before analyzing the associations between teacher self-efficacy, perception of quality of the relationship with colleagues and of positive school leadership, innovativeness of the school, teacher autonomy, role clarity, and role conflicts, we computed the Cronbach's alphas for each scale (values are reported in Table 3) and confirmed the reliability of the measures used. Then, correlations reported in Table 3 were computed. As

expected, teacher self-efficacy was positively associated with the perception of a positive relationship with colleagues and positive school leadership. Correlations were, however, weak (.15 and .20, respectively). The same results emerged (.16 and .20) even when specifying a CFA model — $\chi^2(227) = 753.33$, $p < .001$; TLI = .93; CFI = .94; SRMR = .04; RMSEA = .06, 90% CI [.06, .07] — enabling control of measurement error, which included correlation of the three latent variables (with all observed items loading on the respective latent variable). Finally, correlations found between self-efficacy and, respectively, school innovativeness (.24), curriculum autonomy (.17), and role conflict (–.18) were also weak. Stronger correlations, however, were found with general autonomy (.39) and role clarity (.31).

TABLE 3
Intercorrelations between constructs and Cronbach's alphas of the measures used

		1	2	3	4	5	6	7	8
1	Self-efficacy	(.86)							
3	Relationship with colleagues	.15***	(.91)						
4	School leadership	.20***	.44***	(.94)					
5	School innovativeness	.24***	.48***	.71***	(.92)				
6	Curriculum autonomy	.17***	.01	.05	.14**	(.76)			
7	General autonomy	.39***	.12**	.18***	.22***	.50***	(.75)		
8	Role clarity	.31***	.27***	.25***	.25***	.11**	.30***	(.92)	
9	Role conflict	–.18***	–.28***	–.33***	–.38***	–.01	–.15***	–.15***	(.86)

** $p < .01$. *** $p < .001$.

Fourth, an SEM model was tested. In the model, the school leadership fostered positive relationships with colleagues, degree of school innovativeness, of teacher curriculum and general autonomy, and role clarity, and affected role conflicts. Perceived quality of the relationship with colleagues fostered the perception of school innovativeness and role clarity. Autonomy toward the curriculum and general teaching were influenced by role clarity and role conflict and affected perceived school innovativeness. Role conflicts hindered school innovativeness. Finally, all variables directly affected self-efficacy. This model attained adequate fit indexes, $\chi^2(505) = 1224.43$, $p < .001$; TLI = .94; CFI = .95; SRMR = .04; RMSEA = .05, 90% CI [.04, .05]. Nonsignificant links were found between the school leadership and autonomy both toward the curriculum and general teaching, between general autonomy and school innovativeness, and between role conflict and curriculum autonomy. Moreover, school leadership, relationship with colleagues, curriculum autonomy, and role conflict did not have a direct effect on teacher self-efficacy. A final model, that reached adequate indexes of fit, $\chi^2(513) = 1232.32$, $p < .001$; TLI = .94; CFI = .95; SRMR = .04; RMSEA = .05, 90% CI [.04, .05], was then tested without these links. The model is depicted in Figure 1 and shows that among the considered variables only role clarity, general autonomy, and school innovativeness (positively) directly predict teacher self-efficacy. School leadership seems to have an indirect effect on self-efficacy through the influence that it has on, respectively, school innovativeness (directly affecting self-efficacy), role clarity (directly affecting self-efficacy), and role conflict, the two last affecting, in turn, general autonomy (directly affecting self-efficacy). Similarly, the quality of the relationship with colleagues seems to have an indirect effect on self-efficacy through its impact on school innovativeness and role clarity. Moreover, school

innovativeness was positively and strongly influenced by school leadership, and also by relationship with colleagues, autonomy toward the curriculum, and negatively by role conflict.

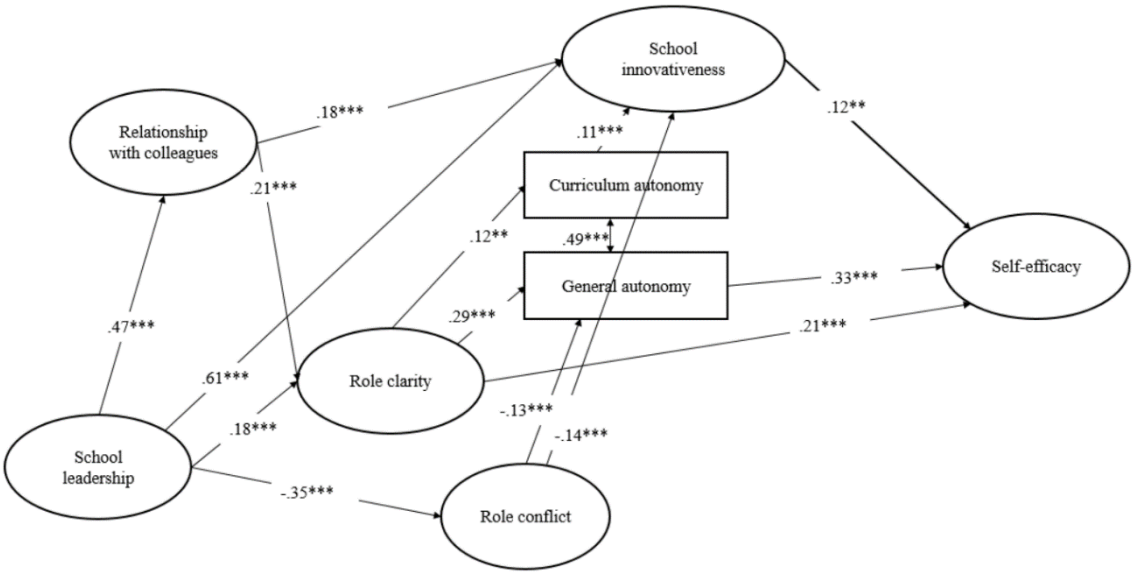

FIGURE 1
Final SEM model
Note. Standardized beta is reported.
** $p < .01$. *** $p < .001$.

DISCUSSION

The first aim of this study was to validate the Italian version of the Teacher Self-Efficacy Scale proposed by Schwarzer and colleagues (1999) in a sample of Swiss teachers, testing its psychometric properties and measurement invariance across gender and school grade.

Cronbach's alpha value and CFA results confirmed that this scale is a valid instrument to measure teacher self-efficacy. However, CFA highlighted that two couples of item errors (1 and 3; 9 and 10) are correlated and this raised some doubts about the monodimensionality of the scale that, however, were cleared up by some further statistical analyses. Results also confirmed that this scale can be used for comparative analyses between, in particular, female and male teachers, both using traditional *t*-tests and ANOVAS and multiple-group SEMs (Byrne, 2010; Steenkamp & Baumgartner, 1998; Steinmetz, 2013). There is no hard rule indicating what degree of partial invariance is acceptable to perform reliable latent mean comparisons. Some authors indicate that one item (besides the marker item) with invariant factor loadings and invariant intercepts might be sufficient for mean comparisons (Steenkamp & Baumgartner, 1998). However, five intercepts out of 10 were not invariant across school grades, indicating that some caution should be exercised when comparing latent means across school grades using multiple-group SEMs and that means comparison should probably be avoided when using *t*-tests and ANOVAs on composite scores (Steinmetz, 2013).

The correlations established with the quality of the relationship with colleagues and school leadership confirmed criterion validity, in line with previous studies (Beasley et al., 2013; Buchanan et al., 2013; Chester & Beaudin, 1996; Chong & Kong, 2012; Darling-Hammond & Bransford, 2005; Devos et al., 2012;

Hoy & Spero, 2005; Hoy & Woolfolk, 1993; Huang et al., 2019; Ingersoll, 2012; Kelly & Northrup, 2015; Ross, 1998; Scott, 2011; Tickle et al., 2011). This study also permitted to examine the less studied associations of self-efficacy with school innovativeness, teacher autonomy toward what to teach and how to teach it, role clarity, and role conflict. All the correlations were significant; however, those with autonomy regarding how to teach, role clarity, and school innovativeness were the strongest. This was also confirmed by the SEM model tested, in which only these three variables were directly linked to teacher self-efficacy. This seems to indicate that the possibility of choosing independently which didactic and pedagogical approaches to use, how to organize the space, and the time to devote to the various topics for the development of students' competences have an important association with the teacher's self-efficacy. This result is in line with those of some previous studies (De Neve et al., 2015; Skaalvik & Skaalvik, 2014), moreover, it highlights that autonomy toward the teaching (the "how" to teach), more than autonomy toward the curriculum (the "what" to teach), might foster self-efficacy. In addition, role clarity — the clarity of the responsibilities entrusted to teachers and the behaviors expected of them — seems to further contribute to improving their self-efficacy, probably because it contributes to clarifying the objectives and the performances which are expected of them, and thus helping them to engage in specific behaviors leading to an increase in professional development. Finally, the perception of working within an innovative school, where innovative and original ideas are encouraged and personal initiative is positively considered, is positively related to teachers' self-efficacy. This result is consistent with the previous associations found between organizational innovativeness and employees' motivation, commitment, and work efficiency (Majer & D'Amato, 2005).

The other variables included in the model, aside from curriculum autonomy, seemed to have only an indirect link to teacher self-efficacy through teacher general autonomy, role clarity, and school innovativeness. Indeed, positive school leadership seems to connect with good quality of the relationships with colleagues, school innovativeness, and role clarity and, negatively, with the perception of role conflict. This further confirms the importance of administrative leadership to foster a positive and vibrant school climate, which, in turn, sustains teachers' self-development and job satisfaction (Hoy & Woolfolk, 1993; Ross, 1998; Scott, 2011).

Good relationships with colleagues also seem to be suitable candidates as antecedents of role clarity and school innovativeness, further highlighting the importance of colleagues, not only because they can be taken as models for the novice teacher or because of the emotional support they can offer, but also for the practical information they can provide and the school climate and culture they contribute to create and maintain. Regarding school innovativeness, interesting results emerged. Indeed, even though we cannot prove it with our cross-sectional model, it seems to be fostered by positive school leadership, quality of the relationships among colleagues, general teaching autonomy, and (negatively) role conflict. Therefore, the better the relationships at school, the fewer the constraints imposed on the contents taught and demands perceived as ambiguous or not in line with one's values, and the greater the school's innovativeness.

Limitations and Future Perspectives for Research

Despite the good psychometric properties confirmed by Cronbach's alpha value and CFA results, the reason why in the measurement model two couples of item errors had to be correlated remains to be clarified. According to Brown (2015), the non-random measurement error that must be correlated can be a result of (1) acquiescent response — a response bias caused by a person's response agreeing with attitude statements regardless of the content of the question; (2) assessment methods; (3) reversed or similarly worded

items; (4) reading disability or cognitive biases affecting a respondent's ability to answer a questionnaire truthfully. In our case, we hypothesized the cause to be the similarity of wording between items. Indeed, Item 1 shares some exact same words with Item 3 "agli allievi più difficili" ("to the most difficult students") and both items explore the teacher's perceived ability in helping these students with learning; Item 9 and Item 10 also share two identical words "progetti innovativi" ("innovative projects") and both explore the teacher perceived ability to carry out innovative projects. There are no other items on the scale that share the same words, so we think this is a plausible hypothesis. However, future studies could look more deeply into the cause of these item errors correlation and possibly consider rephrasing these four items.

Moreover, despite the good psychometric properties of the Teacher Self-Efficacy Scale in Italian, the adequateness of its use for Italian teachers should be further investigated. Indeed, regardless of the geographical proximity of Canton Ticino to Italy and the sharing of the Italian language, several cultural and contextual differences, in particular related to the educational context, might have an impact on the reliability of this scale for the study of Italian teachers' self-efficacy.

Although results remain to be confirmed, possibly with longitudinal study designs that can clarify the direction of effects, we hope that the outcomes of this study may contribute to a better understanding of the associations between teacher self-efficacy and quality of the relationship with colleagues, school leadership, school innovativeness, teacher autonomy, role clarity, and role conflicts. Indeed, although studies have investigated some of these relationships individually or integrated some of these variables in multivariate models, comprehensive models including contextual, relational, and personal variables aiming to explain teachers' self-efficacy are still lacking. We hope that the validation of the Italian version of the Teacher Self-Efficacy Scale, a brief scale also useful for the integration of questionnaires collecting data on multiple variables, will allow such models to be further tested.

Conclusion

The Italian version of the Teacher Self-Efficacy Scale is a reliable measure of teacher perceived self-efficacy. This scale reliably measured self-efficacy beliefs in both male and female teachers, and, with more caution, in teachers of different school grades. It can be comfortably integrated into questionnaires investigating multiple factors. Indeed, being relatively brief, it does not impact excessively on the length of the questionnaire and therefore the risk of decreasing the response rates. Moreover, the study permitted to highlight some important variables fostering teacher self-efficacy. In particular, general autonomy, role clarity, and school innovativeness might directly affect self-efficacy. The study leads to hypothesize that the quality of relationships with colleagues and school leadership might have an indirect impact on teacher self-efficacy through these variables. Thanks to its characteristics and psychometric properties and given how the Teacher Self-Efficacy Scale relates to other important constructs that are, in turn, strongly connected with teachers' personal and professional well-being, the use of this scale may be appropriate in studies aiming to investigate more complex models of personal, relational, and organizational factors affecting the teaching profession.

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