

Measuring teachers' interpersonal self-efficacy: relationship with realized interpersonal aspirations, classroom management efficacy and age

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Received: 21 June 2016 / Accepted: 13 March 2017 / Published online: 20 April 2017
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Abstract In this study, we present the development and validation of an instrument for measuring teachers' interpersonal self-efficacy: the Questionnaire on Teacher Interaction-Self-Efficacy (QTI-SE). We used the Questionnaire on Teacher Interaction as a basis to construct items. Current scales on teacher self-efficacy in classroom management cover interpersonal self-efficacy mostly indirect or they specifically focus on the efficacy to convey relatively high levels of teacher agency (e.g., the teacher's ability to maintain or restore classroom discipline). The QTI-SE is an instrument measuring teachers' interpersonal self-efficacy more comprehensively and in a reliable and valid way.

Keywords Teacher–student relationships · Teachers' interpersonal self-efficacy · Measurement teachers' interpersonal self-efficacy

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1 Introduction

Working with children or adolescents is central to the teaching profession in many ways. It is a reason to enter the profession (Sinclair et al. 2006), but, when interpersonal relationships are poor, also a source of work stress for many teachers (Spilt et al. 2011). Teachers usually have high aspirations regarding the interpersonal aspect of the teaching profession. However, not all teachers feel able to realize these aspirations (Veldman et al. 2016). Teachers' confidence in being able to realize these aspirations can be regarded as a constituent part of teachers' self-efficacy.

More in general, research on teachers' self-efficacy has shown its association with variables such as student achievement, pre-service and in-service teacher commitment (Chesnut and Burley 2015), teachers' feelings of burnout (Tschannen-Moran and Woolfolk Hoy 2001, 2007; Woolfolk Hoy and Davis 2006) and teachers' willingness to adopt and implement reform efforts (Wheatley 2000, 2002). However, teachers' interpersonal self-efficacy, i.e. teachers' self-efficacy in building and maintaining interpersonal relationships with students that are positive and conducive to student learning, has received little attention albeit the central role of interpersonal processes for teachers' job satisfaction and well-being (Spilt et al. 2011) and for classroom processes in general (Wubbels et al. 2014). While some researchers have focused specifically on teachers' self-efficacy in classroom management (Tschannen-Moran and Woolfolk Hoy 2001) and self-efficacy in classroom discipline control (Friedman 2003), to our knowledge no study exists which directly targets the interpersonal self-efficacy of teachers. However, Veldman et al. (2016) found a discrepancy between teachers' self-efficacy measured with the classroom management subscale of the Teacher Sense of Efficacy Scale (TSES; Tschannen-Moran and Woolfolk Hoy 2001) and interpersonal self-efficacy, as reported in interviews, showing that many teachers who felt they were able to correct disruptive student behavior (i.e., a high score on the classroom management scale of the TSES) also reported that they did not feel able to realize a positive relationship with their students. Therefore, the purpose of this paper is to introduce and test a measure of teacher self-efficacy in interpersonal behavior in class.

1.1 Teacher self-efficacy

Bandura (1986, 1997, 2006) defined self-efficacy as “people’s judgments of their capabilities to organize and execute courses of action required to produce given attainments” (p. 3), which means that self-efficacy can be understood as an individual’s belief about what he or she can do successfully (Bong 2006). In regard to teaching, Dellinger et al. (2008) defined teacher self-efficacy as teachers’ “beliefs in their capabilities to perform specific teaching tasks at a specified level of quality in a specified situation” (p. 752).

Accordingly, during the last decades, measurement instruments of teacher self-efficacy have focused on teachers’ beliefs about effective teaching behaviors, such as whether a teacher feels able to “plan activities that accommodate the range of

individual differences among my students” (Dellinger et al. 2008), “use my students’ cultural background to help make learning meaningful” (Siwatu 2007), and “assist families in helping their children do well in school” (Tschannen-Moran and Woolfolk Hoy 2001). Several studies have shown strong relationships between teacher self-efficacy, on the one hand, and student performance and learning (Armor et al. 1976; Goh and Fraser 2000; Guskey 1982, 1988; Tschannen-Moran and Woolfolk Hoy 2001; Woolfolk Hoy and Burke Spero 2005). Strong relationships between teacher self-efficacy and occupational related outcomes are also found for teachers’ commitment (Chesnut and Burley 2015; Coladarci 1992; Klassen et al. 2011), burn-out (Kunter et al. 2011; Skaalvik and Skaalvik 2007), job satisfaction (Tschannen-Moran and Woolfolk Hoy 2001, 2007; Woolfolk Hoy and Davis 2006; Caprara et al. 2003; Kunter et al. 2011; Vieluf et al. 2013), and teachers’ willingness to adopt and implement reform efforts (Wheatley 2000, 2002). In a review study, Zee and Koomen (2016) found that—irrespective of pre- or in-service context, grade level, and country—self-efficacious teachers suffer less from stress and burnout, and experience higher levels of personal accomplishment, commitment and job satisfaction. Klassen and Chui (2010) found that teacher self-efficacy developed nonlinearly with years of experience: teacher self-efficacy regarding engaging students, managing student behaviour, and using effective instructional strategies increased in teachers early and mid-career stages, and declined in the late career stages.

Because of the importance of interpersonal processes in class for the motivation for the teaching profession (Sinclair et al. 2006) and job satisfaction (Grayson and Alvarez 2008; Day et al. 2006; Hansen 1995; OECD 2005; Sinclair et al. 2006) it is important to specifically focus self-efficacy research on teachers’ interpersonal self-efficacy as well.

1.2 Interpersonal processes in class and teachers’ aspirations

Grayson and Alvarez (2008) found that teachers who succeed in maintaining positive interpersonal contact with their students are more likely to stay motivated and enthusiastic in their teaching job and enjoy their work. In line with this, Gu (2014) found that mutually positive perceptions of interpersonal processes in class and trust in teacher–student relationships has been considered a primary source of teachers’ long-term job fulfillment and resilience—through which teachers feel that their hard work is rewarded and valued by students. Moreover, the quality of interpersonal processes in class has been found to be positively related to teachers’ job satisfaction (Grayson and Alvarez 2008; Day et al. 2006; Hansen 1995; OECD 2005; Sinclair et al. 2006), whereas problems with classroom management have a negative impact on teachers’ job satisfaction (e.g., Spilt et al. 2011; Grayson and Alvarez 2008).

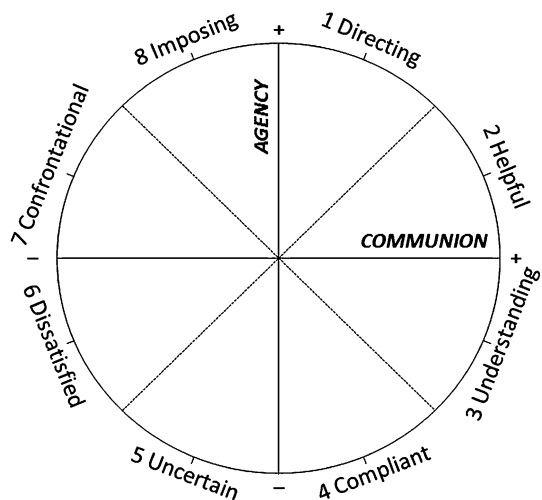
Interpersonal theory (Horowitz and Strack 2010) provides a framework for describing interpersonal relationships and processes. This theory posits that two independent dimensions, which have consistently been found in research, are both necessary and sufficient to describe interpersonal processes and relationships (Horowitz and Strack 2010; Kiesler 1983). The two meta-labels for these

dimensions are agency and communion. The agency dimension concerns social influence and control and ranges from dominance to submissiveness. The communion dimension concerns affiliation and warmth and ranges from agreeable to quarrelsome (Fournier et al. 2011). The two dimensions can be combined using a circle, the interpersonal circle (IPC). The IPC is a weighted combination of levels of agency and communion (Wiggins 1979). For example, while strong leadership or being director reflects high agency and moderately high communion, uncertainty can be described as conveying low levels of agency and moderately low levels of communion. Wubbels et al. (1985) adapted the IPC to the classroom context (the IPC-teacher, formerly also referred to as the Model for Interpersonal Teacher Behaviour; Wubbels et al. 2006). In the IPC-teacher agency and communion underlie eight prototypical interpersonal messages teachers may convey in class (being directing, helpful, understanding and so on; see Fig. 1).

Based on the IPC-teacher the Questionnaire on Teacher Interaction (QTI) was developed (Wubbels et al. 1985, 2006). The QTI taps students' perceptions and teachers' self-perceptions of levels of teacher agency and communion in the relationship with his or her students. The QTI consists of eight scales that each refers to a specific octant of the IPC-teacher. Items in these scales take the form of statements about the teacher such as "This teacher is friendly" (octant 2, Helpful) or "This teacher is strict" (octant 8, Imposing). In some studies by Wubbels (2006), scores on the two underlying dimensions agency and communion are used to analyze the teacher–student relationship. In these studies scale scores corresponding to the octants are converted linearly to dimension scores.

The QTI can also be used to measure teachers' self-perceptions and ideal perceptions with respect to how they behave interpersonally in class. These ideal perceptions can be seen as teachers' aspirations and the difference between teachers' ideal perceptions and their self- or student perceptions can be understood as the degree in which teachers realize these aspirations.

Fig. 1 The interpersonal circle for the teacher (IPC-teacher)



In a longitudinal study, Brekelmans et al. (2005) found that, on average, teachers' aspirations appeared to be rather stable for both agency and communion. Teachers' realizations of their aspirations (i.e., the difference between teachers' ideals and student perceptions) on the agency dimension increased during the first 10 years of teaching and then leveled off. Brekelmans et al. (2005) explained the growth of the degree of realized aspirations on the agency dimension with age and experience of the teachers. Beginning teachers are on average 20–25 years old and usually do not have much experience with leadership roles, and therefore may lack the behavioral repertoire that allows them to be agentic in class. With regard to the communion dimension, Brekelmans et al. (2005) found a small decrease of realized aspirations at the end of the career for the average of their population. Wubbels et al. (2006) explained this with the growing distance, in age and emotionally, between older teachers and their students. As a consequence, teachers may become less connected with students' lifestyles and therefore may become more dissatisfied with student behavior (i.e., low communion), which may lead students to perceive less teacher communion. The danger exists that these teachers may feel required to act more demanding and confrontational, thereby creating a negative interpersonal climate in class and disrupting relationships with students.

The relationship between teacher self-efficacy and interpersonal processes in class show mixed results (Zee and Koomen 2016); high scores for teacher self-efficacy are not always correlated with high scores on the quality of teachers' relationship with individual students. An explanation for these ambiguous findings may be partly due to the variety of selected outcome variables and methods of data analysis in the examined studies (Zee and Koomen 2016).

Because of the importance for teachers to realize their aspirations regarding interpersonal aspects of teaching, it is necessary to know whether teachers feel able to realize these aspirations with respect to interpersonal relationships with their students, that is, to assess teachers' interpersonal self-efficacy.

1.3 This study

In this study we present the development of an instrument for measuring teachers' interpersonal self-efficacy, which we refer to as the Questionnaire on Teacher Interaction-Self-Efficacy (QTI-SE). Existing scales on teacher self-efficacy (e.g. Teacher Sense of Efficacy Scale, Tschannen-Moran and Woolfolk Hoy 2001; Teacher Classroom Efficacy Scale, Friedman 2003) cover interpersonal self-efficacy only indirectly and items often focus specifically on the efficacy to convey relatively high levels of teacher agency (e.g., the teacher's ability to maintain or restore classroom discipline). Especially conveying communion and building positive relationships is underrepresented in existing scales. The development of the QTI-SE was based on themes and items used in the QTI (Wubbels et al. 1985, 2006, 2012) and the process is explained in the next section.

In order to examine the predictive validity, the newly developed QTI-SE was related to the difference in scores on the teachers' ideal- and self-perception with respect to teacher agency and communion. The ideal perception can be considered as a teachers' aspiration regarding interpersonal aspects of teaching. In the current

study, the difference between teachers' self- and ideal perception is used to (indirectly) tap the degree to which teachers think they realize their aspirations regarding interpersonal aspects of teaching. We expected that the higher the scores on the QTI-SE, the smaller the difference between teachers' QTI self- and ideal perceptions. The first research question is:

1. To what extent is the teachers' interpersonal self-efficacy related to teachers' realized aspiration in the relationship with their students?

Secondly, the concurrent validity of the QTI-SE was checked. For this, we used the 'classroom management' subscale of the Teacher Sense of Efficacy Scale (TSES; Tschannen-Moran and Woolfolk Hoy 2001) and the subscales 'classroom discipline control' and 'classroom consideration' of Friedman's Teacher Classroom Efficacy Scale (Friedman 2003). The Classroom discipline control scale focuses on self-efficacy in Classroom management and the Classroom consideration scale on showing empathy, attention and care for students.

We expected moderate positive associations of the QTI-SE with the selected scales. More specifically, we expected a high association between the QTI-SE agency dimension scores and the scores on TSES and the subscale Classroom discipline control, and a high association between the QTI-SE communion dimension scores and the scores on the subscale Classroom consideration. The second research question is:

2. To what extent is teachers' interpersonal self-efficacy related to their self-efficacy with respect to classroom management, classroom discipline control and classroom consideration?

Thirdly, differential validity was evaluated. Klassen and Chui (2010) found that younger and veteran teachers reported a lower self-efficacy than teachers in their mid-career. Therefore, we expected relatively low scores on beginning and veteran teachers' interpersonal self-efficacy compared to the scores of the mid-term career teachers. The third research question is:

3. To what extent do younger teachers and veteran teachers report a lower interpersonal self-efficacy, as compared to teachers in their mid-career?

2 Methods

2.1 Sample

To select teachers for this study, we asked for the collaboration of 15 school boards of professional development schools in the western part of the Netherlands. The boards invited their teachers to participate in our research. All schools were schools for secondary education. Participation was on a voluntary basis and it was made clear that teachers could opt-out at any time. Two rounds of data collection were established. In the first round, in the context of a study among veteran teachers, we

purposefully collected data among teachers older than 55 years. In the second round, we collected additional data among teachers younger than 55 years. In total, 223 teachers (25 younger than 28 years, 88 from 29 to 54 and 110 older than 55 years This adds up to 222 teachers) participated (113 male, 100 female). Scores of four teachers were deleted from further analyses as these were not complete.

2.2 Instruments

We used three instruments to validate our developed new instrument for measuring teachers' interpersonal self-efficacy: the Teacher Sense of Efficacy Scale (TSES), the Teacher Classroom Efficacy Scale (TCES) and the Questionnaire on Teacher Interaction (QTI). The descriptive statistics for these measurements are presented in Table 1.

2.2.1 Teacher Sense of Efficacy Scale (TSES)

A Dutch translation (Mainhard et al. 2008) of the classroom management subscale of the short Teacher Sense of Efficacy Scale (TSES; Tschannen-Moran and Woolfolk Hoy 2001) was used. This subscale includes the following items: (1) "How much can you do to control disruptive behavior in the classroom", (2) "How much can you do to get children to follow classroom rules", (3) "How much can you do to calm a student who is disruptive or noisy" and (4) "How well can you establish a classroom management system with each group of students". Items were rated on a five-point scale ranging from "never" to "always". The reliability of the scale in this sample in terms of Cronbach's α was 0.82.

2.2.2 Teacher Classroom Efficacy Scale (TCES)

We translated Friedman's subscales Classroom discipline control and Classroom consideration (Friedman 2003) into Dutch (forward-backward translation) and piloted the resulting items with 30 teachers who were not included in the current sample. Example items of the Classroom discipline control scale (3 items) are: 'I believe I easily overcome student interruptions in class' and "I believe I handle classroom discipline problems quite well" (Cronbach's $\alpha = 0.77$). Example items

Table 1 Descriptives of variables

	Range	Min	Max	M	SD
QTI: Realized aspirations agency	2.88	-2.10	0.78	-0.32	0.45
QTI: Realized aspirations communion	2.81	-2.07	0.74	-0.54	0.48
TSES—Classroom management	3.00	2.00	5.00	4.02	0.51
TCES—Classroom control	4.00	1.00	5.00	3.89	0.64
TCES—Classroom consideration	2.86	1.86	4.71	3.76	0.48

of the Classroom consideration scale (8 items) are: “I believe I have the ability to encourage students to express their thoughts and feelings freely in my class” and “I believe I am flexible and adaptive in my relations with my students” (Cronbach’s $\alpha = 0.78$). Items were rated on a five point scale ranging from “never” to “always”. The two scales were positively correlated (with $r = 0.50$, $p < 0.01$, $N = 219$).

2.2.3 Questionnaire on Teacher Interaction (QTI)

To measure teachers’ realized aspiration with respect to the interpersonal relationship with their students, teachers were asked to complete the self-perception and ideal perception part of the short version of the QTI (Mainhard et al. 2008; Mainhard 2015; Pennings et al. 2014). The instruction for the ideal perception was “how do you want to teach this class?” and the instruction for self-perceptions was “how do you think you are teaching in this class?” The version of the QTI used here consisted of 24 items rated on a 5-point scale from “never” to “always”. Example items are “this teacher is strict” and “this teacher is uncertain”. The QTI has a circle structure and therefore each item was weighted separately for each of the two underlying dimensions, agency and communion, depending on the position of an item on the IPC (see the introduction of this paper for a description of the transformation of scale to dimension scores). For the ideal perception Cronbach’s α for Agency was 0.67 and for Communion 0.81; for the self-perceptions Cronbach’s α was 0.80 and 0.84, respectively.

2.3 Development of the questionnaire on teachers’ interpersonal self-efficacy (QTI-SE)

We used a 24 item version of QTI (Mainhard et al. 2008; Mainhard 2015) as a basis to construct items measuring teachers’ interpersonal self-efficacy. We used the items belonging to those five octants of the IPC-T (octants 1 through 4 and 8), which have been found to have a positive association with cognitive and/or affective student outcomes (den Brok et al. 2004, 2006; Brekelmans 2010; Mainhard et al. 2008; Mainhard 2015). Moreover, Wubbels et al. (2006) summarized research findings which show the link between teacher–student relationships and student outcomes are characterized by a rather high degree of teacher agency and communion (octants 1 and 2, see Fig. 1). Brekelmans (1989) found a positive relationship between the dimension communion and student motivation (as especially represented by the octants on the right of the IPC, see Fig. 1). Finally, Brekelmans et al. (2000) found a positive relationship between the agency dimension and student perceptions of teacher activation of learning activities.

We crafted items intended to tap teachers’ interpersonal self-efficacy based on the 15 QTI items concerning five octants of the IPC, three items for each octant: (1) directing, (2) helpful, (3) understanding and (4) compliant, (8) imposing (see Fig. 1 for an overview of all items). These items were rated on a five point scale, ranging from “never” to “always”. See the results section for a further description of the questionnaire.

3 Results

3.1 Construct validity and reliability

An exploratory factor analysis was conducted on the 15 items intended to measure teachers' interpersonal self-efficacy following the recommendations of Costello and Osborne (2005). Maximum likelihood was used as an extraction method with oblique (oblimin) rotation and eigenvalues >1 as general criterion for factor selection, but taking into account a scree-test as well. A rather general expectation was that factors related to the dimensions of agency and communion would emerge. The analysis indicated three factors accounting for 49% of the variance in teachers' ratings. The first factor accounted for 31% of the variance, the second factor for 14% and the third factor for only 4% of the total variance. An overview of all items included in the analysis and their factor loadings is provided in Table 2. As a criterion for including an item in a scale a minimum loading of 0.50 and a maximum cross-loading of 0.30 was chosen.

Four items loading on factor 1 scored high on teacher agency and four items loading on factor 2 were interpreted as reflecting the communion dimension. The two items loading on factor 3 reflected low scores on the teacher agency dimension in combination with moderate scores on the communion dimension. Given the low explained variance and small number of items it was decided to remove both items loading on factor 3 from further analyses. The five items with double loadings on the factors were also not included in further analyses. Reliabilities in terms of Cronbach's α for both scales were satisfactory: Agency dimension 0.80 (with items 5, 6, 10 and 15) and Communion dimension 0.78 (with items 2, 3, 12 and 13). The descriptives of the variables included are presented in Table 1.

3.2 Predictive validity

Our first research question regarding the predictive validity of the QTI-SE focused on the relationship between the *QTI-SE* and teachers' realized aspiration. As indicated in the method section, the realized aspiration with respect to relationship with students was measured by the difference between teachers' self and ideal perceptions of the QTI. As expected, we found a significant negative relationship between the teachers' interpersonal self-efficacy (scores on the agency and communion dimension of the QTI-SE) and teachers' realized aspiration in their relationship with students (difference between ideal- and self-perceptions). The correlation for agency was $r = 0.49$ and for communion $= 0.38$ (see Table 3).

3.3 Concurrent validity

Our second question focuses on the relationship between teachers' interpersonal self-efficacy (indicated by the two dimension scores of the *QTI-SE*, on the one hand, and the Classroom management subscale of the TSES (Tschannen-Moran and Woolfolk Hoy 2001) and the subscales Classroom discipline control and Classroom

Table 2 Factor loadings for teacher interpersonal self-efficacy items and means, SD, Pearson's correlations, and internal reliabilities for the resulting factors

Items QTI-SE	Factor		
	1	2	3
1. I am capable of giving good guidance to students (d)	0.34	0.50	−0.34
2. I can inspire trust in students (h)		0.73	
3. I am capable of being patient with students (u)	−0.25	0.53	
4. I am capable of letting students do what they want (c)		0.28	0.43
5. I am capable of setting a norm to guide what students may and may not say (i)	0.78		
6. I am capable of showing my authority in class (d)	0.64	0.26	
7. I can use my sense of humor when interacting with students (h)		0.48	
8. I can empathize with students (u)	0.30	0.28	0.26
9. I am capable of giving students their way (c)			0.61
10. I am capable of demanding silence in class (i)	0.73		
11. I can behave confidently in class (d)	0.43	0.44	−0.26
12. I can create a pleasant atmosphere in class (h)		0.60	
13. I am capable of interacting with students with flexibility (u)		0.80	
14. I am capable of tolerating a lot from my students (c)		0.25	0.54
15. I am capable of keeping strict order (i)	0.72		
Factor mean (<i>SD</i>); range 1–5 (based on bold-printed loadings)			
Cronbach's alpha			
Correlations			
Agency	0.80		
Communion Mean (<i>SD</i>); range 1–5		0.78	
Cronbach's alpha			
Correlations			
Agency	0.80		
Communion		0.78	

N = 219, bold-printed factor loadings were considered acceptable for inclusion

d directing, *i* imposing, *u* understanding, *h* helpful, *c* compliant (see Fig. 1.)

* $p < 0.05$

Table 3 Bi-variate correlations between QTI-SE (agency and communion) and realized aspirations, classroom management, classroom control, and classroom consideration

	QTI-SE agency	QTI-SE communion
QTI: Realized aspirations agency	0.49*	0.27
QTI: Realized Aspirations communion	0.06	0.38*
TSES—Classroom management	0.65*	0.46*
TCES—Classroom control	0.58*	0.33
TCES—Classroom consideration	0.39	0.64*

consideration of the TCES (Friedman 2003), on the other hand. We found positive correlations between the scores on the QTI-SE dimension agency, on the one hand, and the scores on the TSES subscale Classroom management ($r = 0.65$) and Friedman's TSEC-scale Classroom discipline control ($r = 0.58$). We also found a positive correlation between the scores on the QTI-SE communion scale and the scale scores of Classroom consideration ($r = 0.64$). Overall, these results confirmed our expectations regarding the concurrent validity of the QTI-SE. See for all correlations Table 3.

3.4 Differential validity

Our third research question focuses on relationship between teachers' interpersonal self-efficacy and their ages: to what extent do younger teachers and veteran teachers receive lower scores on both QTI-SE dimensions, compared to teachers in their mid-career? Independent t-tests for the mid-career group (age between 28 and 55) showed that the mean score of this age group did not significantly differ from both younger (age 28 or younger) or veteran group (age 55 or higher) neither on the agency dimension [$t(107) = -0.39$; $p = 0.70$] and [$t(193) = -1.48$; $p = 0.14$], respectively] nor on the communion dimension [$t(107) = -0.18$; $p = 0.86$ and [$t(193) = -0.22$; $p = 0.83$, respectively]. Inspection of the regression plots did not suggest that alternative groupings with regard to age would results in significant differences (see Table 4 and 5).

4 Discussion

The aim of this study was to introduce and test an instrument for measuring teachers' interpersonal self-efficacy. Although the importance of interpersonal processes (Grayson and Alvarez 2008; Day et al. 2006; Hansen 1995; OECD 2005; Sinclair et al. 2006; Spilt et al. 2011) and teacher self-efficacy (Caprara et al. 2003; Kunter et al. 2011; Vieluf et al. 2013; Tschannen-Moran and Woolfolk Hoy 2001; Woolfolk Hoy and Davis 2006; Wheatley 2000, 2002; Zee and Koomen 2016) for many teachers and student outcomes has been acknowledged, no instrument that specifically tabs teachers' interpersonal self-efficacy was available.

Table 4 QTI-SE (agency and communion and teachers' age [mid-career (28–55), younger (≤ 28) and veteran (≥ 55)])

	Younger teachers ≤ 28	Mid-career teachers 28–55	Veteran teachers ≥ 55
Mean score agency	3.85	3.91	4.04
SD	0.70	0.59	0.60
Mean score communion	4.20	4.22	4.20
SD	0.51	0.48	0.44
n	24	85	110

Table 5 T-test QTI-SE (agency and communion and teachers' age [mid-career (28–55), younger (≤ 28) and veteran (≥ 55)])

	Younger teachers ≤ 28 — Mid-career teachers 28–55	Veteran teachers ≥ 55 — Mid-career teachers 28–55
T agency	–0.39	1.48
Df agency	107	193
Sig (2tailed) agency	0.70	0.14
T communion	–0.18	–0.22
Df communion	107	193
Sig (2tailed) communion	0.86	0.83

We used the interpersonal circle for the teacher (IPC-teacher) (Wubbels et al. 1985) and the 24 version of the Questionnaire on Teacher Interaction (QTI) (Mainhard et al. 2008; Mainhard 2015) as a starting point for the development of the QTI-SE.

The QTI-SE only includes items that correspond with items from the QTI that have been found to have a positive relationship with cognitive or affective student outcomes (den Brok et al. 2004, 2006; Brekelmans 2010). This means that we used five of the eight octants of the QTI. Factor analyses showed the underlying dimensions of the IPC-teacher on which the QTI is based, agency and communion. In the QTI-SE eight items were included, four in the agency scale and four in the communion scale.

To validate the QTI-SE we examined the predictive validity, the concurrent validity and the differential validity. First, a moderate positive correlation was found between the agency and communion scores of the QTI-SE and teachers' realized aspirations in their relationship with their student (as indicated by the difference scores between the self- and ideal perception of the teacher–student relationships on both dimensions. Secondly, moderate positive correlations were also found between the QTI-SE dimension scores and the subscale Classroom management of the TSES (Tschannen-Moran and Woolfolk Hoy 2001) and the subscales Classroom control and Classroom consideration of the Teacher Classroom Efficacy Scale (TCES) (Friedman 2003). These correlations support predictive and concurrent validity of the QTI-SE. Finally, we did not find any significant relations between the scores on the QTI-SE dimensions agency and communion and teachers' age. An explanation for not finding this relationship might be that a decline in teachers' self-efficacy might occur for only a part of the population, which is certainly the case for the communion aspirations of veteran teachers (Brekelmans et al. 2005). Some teachers are able to keep up high levels of teacher–student communion until the end of their career (Veldman et al. 2013, 2016). It might very well be that these teachers also are more inclined to participate in research, which brings us to a limitation of our study.

As our study employed a convenience sample, it is possible that teachers, who for example experienced problems in interpersonal processes and subsequently might

have a low interpersonal self-efficacy, did not participate. Yet, the bias of this self-selection is limited as this would be the case for all our measurements.

Further research could elaborate on this research by selecting other teachers and other variables to deepen our insight in the role of self-efficacy for teaching quality and teachers' job satisfaction and well-being during their entire career. In particular, future research investigating the predictive validity of the QTI-SE, can focus on the relationship between teachers' interpersonal self-efficacy and student performances, building on former research which has revealed that teacher–student relationships characterized by a rather high degree of teacher agency and communion (octants 1 and 2, see Fig. 1) have been found to have a positive association with cognitive and/or affective student outcomes (den Brok et al. 2004, 2006; Brekelmans 2010; Mainhard et al. 2008; Mainhard 2015).

The QTI-SE is an instrument measuring teachers' interpersonal self-efficacy in a reliable and valid way. The QTI-SE is an addition to the Classroom management subscale of the TSES (Tschannen-Moran and Woolfolk Hoy 2001) and the subscales Classroom discipline control and Classroom consideration of the TCES (Friedman 2003). Whereas the TSES has a focus on classroom management and the TCES focuses on classroom management and classroom consideration, the QTI-SE deepens the aspects of interpersonal self-efficacy, focused on the two dimensions underlying teacher–student relationships: agency and communion.

In the future, the QTI-SE can be a valuable tool to measure teachers' interpersonal self-efficacy, signaling potential problems for beginning as well as experienced teachers.

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