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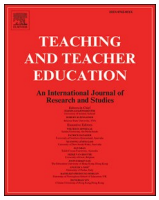

Research paper

Teachers' closeness of professional relationship and its role in learning perception after reciprocal peer observation

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ABSTRACT

Extant literature on reciprocal peer observation has reported teachers' perception of positive effects on interpersonal relationships. However, pretest-posttest evidence is missing (first aim), and its role in teacher learning has not been examined (second aim). 364 teachers participated in this study. First, it provides pretest-posttest evidence of increased closeness of professional relationship, as well as exploratory teacher interpretations via group interviews. Educational stage might affect this increase. Second, it shows that, rather than initial closeness as a prerequisite, it is final closeness which significantly affects teacher learning perception. Statistical analyses also show the relevance of school time arrangement.

1. Introduction

Teachers need to continuously improve their knowledge and skills to maintain the quality of their professional role (OECD, 2019). Teacher professional development is defined as teachers' ongoing learning process, that is, the acquisition and elaboration of knowledge, skills, and attitudes to support student learning (Avalos, 2011; Fischer et al., 2018; Kennedy, 2006; Postholm, 2012; Sancar et al., 2021). Expert teachers are found to extensively reflect on their practice, to help their colleagues frequently, and to be continuous learners throughout their careers (Anderson & Taner, 2023). From a sociocultural perspective, teacher professional development should consider the zone of proximal teacher development (ZPTD) (e.g., Kuusisaari, 2014; Murphy et al., 2015; Potgieter & van der Walt, 2022; Warford, 2011), that is, "the distance between what teaching candidates can do on their own without assistance and a proximal level they might attain through strategically mediated assistance from more capable others" (Warford, 2011, p. 253).

1.1. Practices for teacher professional development

Educational institutions commonly prompt teacher professional development through formal training courses provided by an expert (Kennedy, 2006). However, not only experts but also peer teachers can boost teacher professional development (Johnson, 2003; Kennedy, 2006; Popova et al., 2021). In fact, teachers often help each other solve teaching problems informally (Jurasaite-Harbison & Rex, 2010). Several interventions have tried to formally structure peer interaction between teachers for teacher professional development. While some interventions are based on asymmetrical relationships between teachers, with some of them taking a formal leadership role (Taylor et al., 2011), others propose more symmetrical relationships. It is the case of communities of practice (e.g., Eshchar-Netz & Vedder-Weiss, 2021), professional learning networks (e.g., Miquel & Duran, 2017; Trust et al., 2016), and professional learning communities (e.g., Johannesson, 2022), which are based on the interaction within a group of teachers that share common goals. The advantages of quality teacher collaboration have been defended for a long time (e.g., Little, 1987). There is evidence of its effectiveness both for teacher professional development (e.g., Sun et al., 2013) and for student achievement (e.g., Ronfeldt et al., 2015; Sun et al., 2017). The concept of joint practice development was coined to emphasise collaborative teacher professional development, in contrast with top-down approaches (Fielding et al., 2005; I-Hui-Chen, 2022; Madrid & Chapman, 2022).

Some forms of teacher collaboration are based on one-to-one interactions, with co-teaching being the direct collaborative model par excellence (e.g., Colson et al., 2021; Murawski & Dieker, 2008). In co-teaching, two teachers work together by jointly planning, implementing, and assessing the lessons (Friend et al., 2010). Research has

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shown the benefits of co-teaching as an effective instructional model for inclusion (e.g., McDuffie et al., 2009; Pancsofar & Petroff, 2016; Villa et al., 2008), but also for teacher professional development (e.g., Duran et al., 2020; Härkki et al., 2020; Jardí et al., 2022; Pratt, 2014; Rytvaara & Kershner, 2012).

Peer observation, where one teacher teaches the lesson while the other one observes, can be considered a form of co-teaching (Baeten & Simons, 2014). Although some forms of peer observation can adopt an evaluative function by managerial or academic staff —with significant drawbacks for teacher professional development (Byrne et al., 2010; O'Leary & Savage, 2020)—, other forms become more formative (Fletcher, 2018). It is the case of developmental practices in which an educational expert acts as the observer and encourages the observee's reflection after the session, but also of collaborative practices in which the observer's role is taken by a collegial teacher who can also learn from this role (Fletcher, 2018; O'Leary & Savage, 2020). When the two collegial teachers exchange and carry out both roles (i.e., observer and observee), the practice is referred to as reciprocal peer observation (RPO). Research suggests that RPO can foster teacher professional development, but offering and receiving critical feedback becomes challenging (see Corcelles-Seuba, Soler, et al., 2023, for a review on RPO).

1.2. Interpersonal relationships in teacher collaboration

Articles on teacher collaboration emphasise interpersonal relationships between teachers as a relevant factor for its success, with collegiality and trust being the concepts that receive the most attention (e.g., Jardí et al., 2022; Jurasaite-Harbison & Rex, 2010; Löfgren & Karlsson, 2016; Ninkovic et al., 2022; Rytvaara & Kershner, 2012). The concept of collegiality is amorphous and not always distinguished from collaboration (Fielding, 1999). According to Kelchtermans (2006), collegiality can be defined as "the quality of the relationships among staff members in a school" (p. 221), referring to reciprocity, cohesion, and mechanisms for internal control among colleagues with similar competencies (Svensson, 2010). Research has shown that effective collegiality in schools enhances teacher professional development, student learning and school effectiveness, and increases job satisfaction —see Shah (2012) for a review.

As for trust, it can be defined as "an individual's or group's willingness to be vulnerable to another party based on the confidence that the latter party is benevolent, reliable, competent, honest, and open" (Hoy & Tschannen-Moran, 2003, p. 203). Teacher trust is complex, including the following basic dimensions: trust in colleagues, trust in the principal, and faculty trust in students and parents (Tschannen-Moran & Barr, 2004). Based on these dimensions, the Omnibus T-Scale was developed to measure teacher trust (Hoy & Tschannen-Moran, 2003). Ninkovic et al. (2022) used its subscale on teacher trust in colleagues. They found that teacher trust in colleagues has a direct effect on teachers' collective efficacy and an indirect effect on it via shared responsibility. Complementarily, Hargreaves (2002) found that the opposite of trust (i.e., betrayal) was one of the strongest sources of negative emotions reported by teachers, leading them to avoid conflict and interaction with their peers. Not only is trust related to teacher involvement in professional learning and school effectiveness (Bektaş et al., 2020; Bellibaş & Gümüş, 2021; Karacabey et al., 2022; Tschannen-Moran & Barr, 2004; Vangrieken et al., 2015), but also to job satisfaction (Edinger & Edinger, 2018; Li et al., 2018; Van Droogenbroeck et al., 2014; Yin et al., 2019). The positive effects of trust on the interaction of team members can be explained by the experience of psychological safety, which refers to a person's "perceptions of the consequences of taking interpersonal risks in a particular context such as a workplace" (Edmondson & Lei, 2014, p. 24). The climate of psychological safety contributes to behaviours such as knowledge sharing, seeking feedback, talking about mistakes and worries, and taking the initiative (Edmondson & Lei, 2014; Stoll et al., 2006).

1.2.1. Interpersonal relationships in peer observation

According to Corcelles-Seuba, Soler, et al. (2023), who carried out a review of RPO in compulsory education, teachers perceive that RPO helps to build more supportive and trusting collaborative relationships (Alam et al., 2020; Daniels et al., 2013; Gray, 2012; Kohler et al., 1995; Motallebzadeh et al., 2017; Murray et al., 2009; Sider, 2019; Verástegui & González, 2019), to improve teaching teams' cohesion by shaping a common language (Hall & McKeen, 1989; Rosselló & De la Iglesia, 2021), and to overcome teachers' isolation (Arnau, Kahrs, & Kruskamp, 2004; Avila et al., 1991; Bruce & Ross, 2008; Hall & McKeen, 1989; Hamilton, 2013; Slater & Simmons, 2001).

Except for three articles (Hall & McKeen, 1989; Motallebzadeh et al., 2017; Slater & Simmons, 2001), the studies did not intentionally aim at analysing the role of interpersonal relationships in RPO, but focused on teacher perception of RPO interventions. Qualitative instruments were mainly used for data collection, such as focus groups (Alam et al., 2020; Daniels et al., 2013; Gray, 2012; Verástegui & González, 2019), interviews (Arnau et al., 2004; Bruce & Ross, 2008; Gray, 2012; Hamilton, 2013; Sider, 2019; Slater & Simmons, 2001; Verástegui & González, 2019), reports (Kohler et al., 1995; Rosselló & De la Iglesia, 2021), audiotapes and videotapes (Kohler et al., 1995; Murray et al., 2009), and open-ended survey questions (Motallebzadeh et al., 2017; Murray et al., 2009; Rosselló & De la Iglesia, 2021). The three studies that intentionally addressed interpersonal relationships in RPO included items about trust (Hall & McKeen, 1989), communication and cooperative atmosphere (Motallebzadeh et al., 2017), and companionship (Slater & Simmons, 2001). However, they used quantitative questionnaires as a final evaluation of the programme (Hall & McKeen, 1989; Motallebzadeh et al., 2017; Slater & Simmons, 2001), but none of them adopted a pretest-posttest design. Moreover, the items did not specifically refer to the relationship with the RPO partner but with teacher colleagues from the school in general, and the studies did not analyse whether interpersonal relationships were related to teachers' learning perception.

1.2.2. The present study

This study aims to address these research gaps by focusing on closeness of relationships. This concept has been of interest for social psychologists, especially in romantic and friendship relationships (e.g., Berscheid et al., 1989; Frost & LeBlanc, 2022; Starzyk et al., 2006). According to Kelley et al. (1983), relationship closeness refers to the degree of interdependence between two people. In the area of education and educational psychology, research on teacher–student relationships has focused on closeness of relationships for its impact on student learning and behaviour (Cornelius-White, 2007; Lei et al., 2016) and teacher wellbeing (Spilt et al., 2011). However, as to teacher–teacher relationships, research in terms of closeness of professional relationship is scarce. Social support and trust play an important role in increasing teacher job satisfaction and reducing teacher attrition (Edinger & Edinger, 2018; Li et al., 2018; Li & Yao, 2022; Toropova et al., 2021; Van Droogenbroeck et al., 2014), in line with research showing that positive interpersonal relationships are essential for workplace satisfaction (e.g., Reich & Hershcovis, 2011; Rispens et al., 2011).

Based on the literature on interpersonal relationships in educational environments (e.g., Corbin et al., 2019; Milatz et al., 2015), closeness of professional relationship between teachers could be defined as the degree of emotional and interpersonal connection, trust, and collaboration that exists between teachers in an educational setting. It encompasses the ability to effectively work together, share ideas, provide mutual support, and engage in constructive communication. Closeness of professional relationship between teachers can be characterised by the willingness to work together for the improvement of their teaching and their students' learning experiences. Positive emotions, including connectedness, support, joy, and attachment, are critical for building close relationships (Milatz et al., 2015).

Given that positive collegial relationships seem paramount for teachers, this study tries to address a twofold need. Firstly, there is the

need to identify practices that help improve collegial relationships between teachers. Secondly, there is the need to examine whether interpersonal relationships affect teacher learning in such practices, especially considering the widely held belief that closeness of relationships is a prerequisite for successful collaboration. From a sociocultural perspective, RPO can provide teachers with the opportunity to improve their teaching practice thanks to the interaction with a colleague in their ZPTD, following the concept coined by Warford (2011). In this sense, the external dialogue between teachers and the internal thinking processes of each teacher are intertwined in favour of reflection on practice. Considering Engeström's (2015) expansive learning approach, not only receiving feedback but also providing feedback might be beneficial for teacher learning, within the collaborative, supportive interaction that characterises RPO. It may well be the case that this supportive environment helps construct closer professional relationships that not only foster learning from the specific intervention, but also pave the way for future collaborative endeavours.

All in all, although extant literature on RPO has reported teachers' perception of positive effects on interpersonal relationships, pretest-posttest evidence is missing, and its role in teacher learning has not been examined. Thus, two research questions are addressed in this study.

(1) When teachers take part in RPO, is there an increase in their perceived closeness of professional relationship with their partner? If so, what elements do teachers attribute this increase to?
(2) Does perceived closeness of professional relationship influence teacher perception of learning after RPO?

2. Materials and methods

2.1. Participants and context of implementation

A total of 364 teachers (158 from Balearic Islands and 206 from Catalonia) voluntarily took part in an intervention based on RPO, grouped into 182 pairs. Teachers were asked to join the intervention in pairs (i.e., with another teacher from the same school). Thus, pairs were created by teachers themselves within the school. Demographic data was collected. As for age, 34 participants were in their 20s (9.34%), 122 in their 30s (33.52%), 136 in their 40s (37.36%), and 72 were older than 50 years of age (19.78%). As for gender, 73 were men (20.06%), 284 were female (78.02%), and 7 were non-binary or preferred not to answer (1.92%). As for teaching experience, 73 participants (20.06%) were novice teachers (i.e., 0–4 years of teaching experience), 95 had between 5 and 11 years of teaching experience (26.10%), 105 had between 12 and 19 years of teaching experience (28.85%), and 91 had 20 or more years of teaching experience (25.00%). As for the years they have been in that school, 89 participants reported 0–1 year (24.45%), 93 have been there for 2 or 3 years (25.55%), 86 for 4–8 years (23.63%), and 96 for 9 or more years (26.37%). As for the educational stage, 40 teachers came from preschool education (10.99%), 111 from primary education (30.50%), 157 from compulsory secondary education (43.13%), and 56 (15.39%) from post-compulsory education (i.e., baccalaureate preparation for university and vocational training). Before the start of the intervention, 128 teachers (35.17%) reported having prior experience in peer observation.

Before the implementation, teachers were provided with two 1.5-h training sessions. In the first session, they were presented the concept, benefits, and challenges of RPO, as well as the aims of the research project. In the second session, right before the start of the intervention, the four-stage process for RPO (Fig. 1) was thoroughly revised (Duran et al., 2020; O'Leary, 2020; O'Leary & Savage, 2020). Firstly, a pre-observation meeting, in which the two teachers agree on the observation focus and indicators, revise the features of the two roles (i.e., observer and observee), and set the dates for the observation to take place. Secondly, the observation sessions, at least one per teacher, exchanging the roles. After the session, the observee writes a postobservation report, where they indicate their own feelings about being observed, as well as parts of the lesson that went right or wrong and why. Thirdly, the feedback meeting, in which they dialogically share their assessment of each other's lesson, identifying areas of improvement. It is suggested that the feedback meeting starts with the observer inviting the observee to share their postobservation report. Fourthly, a written reflection by the observee to specify the goal for improvement and possible actions to achieve it.

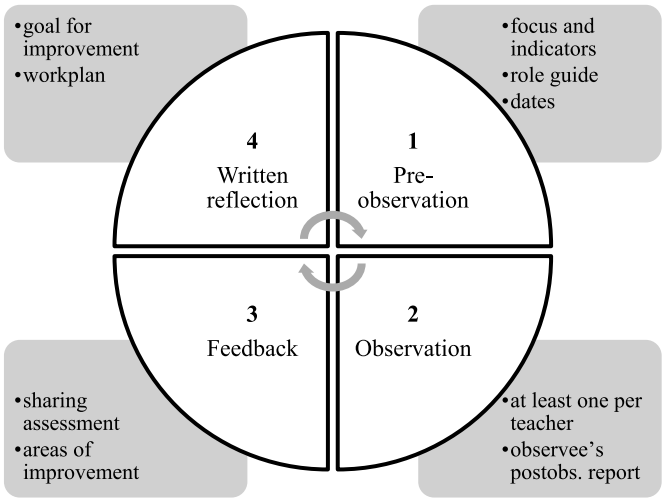

Fig. 1. The four-stage RPO cyclic process.

Teachers were provided with support materials: a) a booklet with a role guide for observation and feedback based on O'Leary (2020), emphasising the use of questioning for specific, non-judgemental feedback rather than general, evaluative feedback; b) a preobservation agreement, including the observation focus and indicators, dates, data collection, revision of the role guide, and confidentiality; and c) orientations for the written report and reflection, mainly in the form of subsections and/or guiding questions. One round of RPO was suggested (i.e., with one observation session per teacher). The choice of the observation focus was up to each pair of teachers. The support materials contained some examples for sharing objectives with students and formative assessment strategies.

2.2. Data collection

2.2.1. Closeness of professional relationship pretest and posttest

As pretest and posttest, participants answered the Inclusion of the Other in the Self Scale (IOS; Gächter et al., 2015), a one-item pictorial instrument to be answered in a 7-point Likert format. This single-item instrument is reliable because it strongly correlates with an index based on other multi-item scales designed to measure closeness of relationship (Gächter et al., 2015). Participants were asked to select the pair of circles that best described their professional relationship with their partner (Fig. 2). Unlike the original version of IOS, in this study participants were asked to specifically focus on professional relationship instead of relationship in general.

2.2.2. Group interviews

A convenience sample of 61 teachers (i.e., those who were available to meet online on the suggested date and time) participated in four group interviews, with 14–17 teachers per interview. The distribution criteria for the interview groups were that participants within each group were 1) from different schools, and 2) in a different group than their RPO partner. They were provided with the main finding (i.e., RPO increases closeness of professional relationship) and they were asked for their interpretation, based on the following question: 'Why does RPO

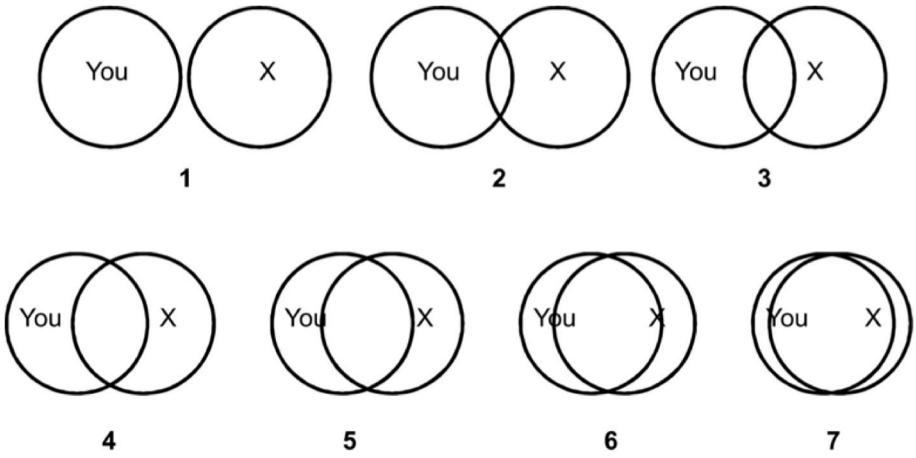

Fig. 2. The IOS Scale
Note. Retrieved from Gächter et al. (2015).

increase the closeness of professional relationship?'. The 1-h interviews also addressed other questions that were not the focus of this study. An average of about 8 min (in seconds, $M = 478.25$; $SD = 103.27$) was allocated for this question on closeness of professional relationship. Out of the 61 teachers in the group interviews, 21 intervened. The interviews were carried out online via Jitsi (i.e., a video conferencing software) and were recorded and transcribed.

2.2.3. Peer Observation Perceived Learning (PeOPLe) final questionnaire

As a final questionnaire, participants answered a set of items in a 4-point Likert format, based on extant literature on learning benefits from peer observation (see Corcelles-Seuba, Soler, et al., 2023, for a review). The questionnaire had been used in a pilot study the year before, with 261 teachers (Corcelles-Seuba, Duran, et al., 2023). This sample was used to carry out an Exploratory Factor Analysis (EFA), based on parallel analysis and oblimin rotation, with a factor loading cutoff of 0.7. It resulted in two factors, referring to personal ($\alpha = 0.886$) and institutional ($\alpha = 0.884$) learning. A good model fit was reported: Chi-squared ($p = .555$), Bartlett's test ($p < .001$), Kaiser-Meyer-Olkin test (KMO = 0.864), Tucker Lewis Index (TLI = 1.004), and Root Mean Square Error of Approximation (RMSEA = 0.000). The two factors explained 73% of the variance (38% and 35%, respectively). The questionnaire on Peer Observation Perceived Learning (PeOPLe) consists of six items — three per factor (Table 1).

A Confirmatory Factor Analysis (CFA) with the sample of 364 teachers from this study was carried out with Diagonally Weighted Least Squares (DWLS) as the estimator for ordinal data. CFA showed good fit indices (Comparative Fit Index [CFI] = 1.000; TLI = 1.000; RMSEA = 0.019; Standardized Root Mean Square Residual [SRMR] = 0.032). Cronbach's alpha and McDonald's omega values for this sample were acceptable for personal ($\alpha = 0.752$; $\omega = 0.756$) and institutional ($\alpha = 0.868$; $\omega = 0.869$) learning.

Table 1
Factor loadings and uniqueness after EFA for learning perception items.

Items	Factor loading	Uniqueness
Personal learning		
Reflecting on my own practice based on the analysis of my partner's practice; knowing myself better.	.887	.198
Being more aware of my partner's teaching style and realising the aspects we have in common and those we do not.	.858	.262
Starting to make changes in my own practice.	.788	.365
Institutional learning		
Fostering collaborative culture between teachers and willingness to plan materials and sessions together.	.928	.261
Identifying shared needs for improvement between teachers, starting future actions for teaching improvement.	.808	.237
Creating feelings of empathy, personal and mutual trust between teachers.	.725	.321

2.2.4. Demographic variables

Besides age and gender, participants were asked to report years teaching, years in the school, educational stage, and whether they had prior experience in peer observation (PO). They were gathered as control variables.

2.2.5. Perception of school enabling time arrangements for RPO

Along with the pretest, participants were asked to indicate the level of agreement with the following item in a 4-point Likert format: "The school is offering time so that we can meet to carry out RPO". Together with demographic variables, it was gathered as a control variable.

2.3. Data analysis

2.3.1. Research question 1: increase in teachers' closeness of professional relationship

For preliminary analyses, separate Kruskal-Wallis ANOVAs were carried out, with initial closeness (i.e., pretest) as the dependent variable and control variables (i.e., age, gender, years teaching, years in the school, educational stage, prior experience in PO, school time arrangement) as independent variables. If significant, post hoc comparisons were carried out via Dunn's test, with p values adjusted after Bonferroni correction. Supplementary analyses (i.e., Spearman's rank correlation, chi-squared test, Kruskal-Wallis ANOVA) were carried out if necessary to help interpret the findings.

Wilcoxon signed-rank test was used to compare pretest and posttest scores. Subgroup analysis was also carried out, after three groups were created based on initial level of closeness: low (1 or 2), medium (3, 4 or 5), and high (6 or 7). Increase in closeness was computed as a new variable, by calculating the difference between posttest and pretest scores. Bivariate analyses via ANOVAs were carried out with increase in closeness as the dependent variable, and each of the control variables as independent variables. After bivariate analyses, if more than one control variable was significant, they were included within a single ANOVA. All statistical tests in this study were carried out via JASP v0.16.4. Significance level was set at $p < .05$.

Group interviews were analysed using Atlas.ti 22. An inductive process was carried out to code teachers' interventions. A category system was defined based on extant literature on factors influencing work commitment and teachers' attrition, including trust, professional

identification, or organizational commitment (Hackett et al., 2001; Li & Yao, 2022). A preliminary category system was generated by identifying common factors from prior studies and selecting those that apply to the educational environment. In the second phase, the category system was implemented for coding purposes, resulting in the use of seven categories based on the content of the group interviews: feedback, knowledge sharing, personal bond, mutual help, commitment, teaching improvement, and empathy. Two researchers independently coded the interventions, reaching an 81% agreement. A meeting between the two researchers was held to discuss cases of disagreement. They were discussed one by one, with the two researchers presenting and debating the reasons behind their choices, based on the definition and nuances of each category. If necessary, these definitions were reworded. In this process, the two researchers jointly recoded cases of disagreement upon reaching consensus. A total of 26 interventions were coded with one (21 cases) or two codes (5 cases). From the 21 intervening participants, a minimum of one intervention and a maximum of four interventions per interviewee were coded. Discourse analysis was carried out. First, a word cloud and a list of repeated words enabled the identification of frequent terms. Then, similar terms were grouped into concepts that occurred five or more times. Frequencies and percentages of occurrence were reported.

2.3.2. Research question 2: the role of closeness in teacher learning perception

First, descriptive statistics of the learning perception score were reported, overall and for each factor. Factor scores were compared via Student's *t*-test. Bivariate analyses via ANOVAs were carried out with overall learning perception as the dependent variable, and initial and final closeness, as well as control variables, as independent variables. Supplementary analyses (i.e., chi-squared test, Kruskal-Wallis ANOVA) were carried out if necessary to help interpret the findings.

Then, a backward stepwise ANOVA was carried out with learning perception as the dependent variable, and independent variables that obtained a *p*-value of $< .10$ in prior bivariate analyses from research questions 1 and 2. Within the ANOVA, independent variables that obtained a *p*-value of $< .10$ remained in the model. For each independent variable, post hoc comparisons were carried out via pairwise *t*-tests, with *p* values adjusted after Bonferroni correction. A separate model was also developed for each factor of learning perception (i.e., personal learning and institutional learning).

3. Results

3.1. Research question 1: increase in teachers' closeness of professional relationship

The findings regarding the first research question are presented below (i.e., When teachers take part in RPO, is there an increase in their perceived closeness of professional relationship with their partner? If so, what elements do teachers attribute this increase to?).

Focusing on initial closeness, bivariate analyses show that school time arrangement significantly affects initial closeness ($p = .010$). Descriptive statistics show that those participants who report a maximum school time arrangement (i.e., 4 out of 4 in the Likert-format item) show a higher initial closeness ($M_4 = 4.875$; $SD_4 = 1.652$) than the other three groups ($M_1 = 4.089$; $SD_1 = 1.957$; $M_2 = 3.962$; $SD_2 = 1.605$; $M_3 = 4.273$; $SD_3 = 1.683$). Only the pairwise comparison with the rather low group (i.e., 2 out of 4) reaches significance ($p_{bonf} = .006$). The other control variables do not significantly affect initial closeness ($0.057 \leq p \leq .525$). Years in the school obtains a *p*-value of .057. A correlation analysis between years in the school and initial closeness shows a significant positive but weak correlation (Spearman's $\rho = 0.140$; $p = .007$). A chi-squared test between school time arrangement and years in the school is not significant ($p = .104$). However, a Kruskal-Wallis ANOVA with school time arrangement as the dependent variable and years in the school as the independent variable shows significant differences between groups ($p = .016$). Descriptive statistics show that those participants who have been in the school for 9 or more years report a higher school time arrangement than the other groups ($M_{0–1} = 2.360$; $SD_{0–1} = 0.843$; $M_{2–3} = 2.333$; $SD_{2–3} = 0.913$; $M_{4–8} = 2.523$; $SD_{4–8} = 1.003$; $M_{9+} = 2.719$; $SD_{9+} = 0.926$). The post hoc tests of the group with 9 or more years in the school compared to the groups with 0–1 year ($p_{bonf} = .008$) and 2–3 years ($p_{bonf} = .004$) are significant.

Focusing on the pretest-posttest comparison, results show that participants significantly increased the closeness of professional relationship towards their partner. Subgroup analysis shows that this is true for participants with low and medium initial levels, but not for those with high initial levels (Table 2). Bivariate analyses suggest that the increase in closeness is affected by educational stage ($p = .005$; $\eta^2 = 0.035$), but the other variables are not significant ($0.457 \leq p \leq .994$). Descriptive statistics per educational stage show that preschool teachers achieve a higher increase in closeness than the other stages ($M_{preschool} = 1.575$; $SD_{preschool} = 1.448$; $M_{primary} = 0.892$; $SD_{primary} = 1.479$; $M_{compulsory} = 0.631$; $SD_{compulsory} = 1.574$; $M_{post\text{-}comp.} = 0.804$; $SD_{post\text{-}comp.} = 1.285$). Only the pairwise comparison with compulsory secondary education reaches significance ($p_{bonf} = .002$; $d = 0.634$), while the comparisons with primary ($p_{bonf} = .080$; $d = 0.458$) and post-compulsory education ($p_{bonf} = .077$; $d = 0.518$) do not reach significance after Bonferroni correction.

Main findings from group interviews on the explanations given by the teachers to interpret the increase in closeness of professional relationship after RPO reveal that feedback, knowledge sharing, personal bond, and mutual help are substantial (Table 3).

A word cloud (Fig. 3) reveals that some terms are repeatedly used by teachers when they provide explanations to interpret why RPO increases the closeness of professional relationship, such as observation (10 times), professional (8), classroom (7), peer (7), teaching (7), feedback (6), rapprochement (6), share (6), know (5), work (5). The other terms occur less than five times.

Further analysis after grouping similar terms into concepts shows that observation is the most frequent concept, together with partner (Table 4).

3.2. Research question 2: the role of closeness of professional relationship in teacher learning perception

Regarding learning perception, descriptive statistics show that the overall score is high, with a mean of 3.44 out of 4 points ($SD = 0.477$). The two factors (i.e., personal and institutional learning) obtain a mean score of 3.51 ($SD = 0.468$) and 3.37 ($SD = 0.621$), respectively, with a significant difference between them ($p < .001$; $d = 0.255$).

Regarding the role of closeness, bivariate analyses suggest that both initial ($p = .028$) and final closeness levels ($p < .001$) significantly affect learning perception. As for control variables, bivariate analyses suggest that two of them significantly affect learning perception as well: school time arrangement ($p < .001$) and educational stage ($p = .024$). The other variables are not statistically significant ($0.344 \leq p \leq .930$).

In the backward stepwise ANOVA—conducted to identify which

Table 2
Posttest-pretest comparison of perceived closeness of professional relationship.

Initial level	*N*	Posttest *M* (*SD*)	Pretest *M* (*SD*)	*W*	*p* value	Rank-Biserial Correlation
Low	59	3.559 (1.674)	1.678 (0.471)	984	<.001	.988
Medium	206	4.927 (1.383)	3.888 (0.822)	10,678	<.001	.789
High	99	6.253 (1.063)	6.444 (0.499)	429	.127	−.239
Overall	364	5.066 (1.611)	4.225 (1.716)	25395.5	<.001	.685

Table 3
Emergent categories describing the factors to explain the increase in closeness.

Category	Definition	*f*	%	Excerpts
Feedback	Information given to the peer on the teaching practice, related to the established goals.	8	25.806	'Constructive feedback is given based on a methodological basis on which we are being trained and this generates closeness, and feedback is easier.'
Knowledge sharing	Exchange of information and understanding as a result of peer collaboration.	7	22.581	'From teaching individually to doing it collectively, common interests, same goals, same perception. Everyone was locked up in their class and, in the end, we all wanted the same thing. […] Teachers who are interested and highly motivated want the best for their students and try to search tools and share them with others.'
Personal bond	Personal relationship with emotional involvement.	6	19.355	'A classroom is an intimate space. Entering and sharing that space generates a personal bond. There is a space for review, to evaluate, and proximity allows us to observe the evolution.'
Mutual help	Interaction with a workmate to cope with teaching problems.	4	12.903	'You are in the same boat with the other partner, educating and trying to be responsible for the same group. We must row in the same direction even if one is an observer and the other is observed; we must support each other.'
Commitment	Teachers' attachment toward their work.	2	6.452	'Agreeing to take part in this proposal [PO] generates commitment, leaving resistance and prejudices behind, and you generate a friendly environment between the observer and the observee.'
Teaching improvement	Continuous process of increasing the quality of teaching.	2	6.452	'A space for reflection is generated and there are proposals for improvement; you know the indicators that guide you but there are joint proposals, proposals for improvement.'
Empathy	Understanding of another person's emotions and perspectives.	2	6.452	'Evaluating a workmate sparks the process of empathy, especially when giving feedback.'

Fig. 3. Word cloud of the terms used by teachers in group interviews.

Table 4
Grouping of similar concepts from the responses to closeness' discussion.

Concept	Terms grouped	*f*
Observation	Observed, observer, observing, observe, observation	21
Partner	Peer, co, colleague, partner, workmate	20
Closeness	Close, closeness, closer, rapprochement	16
Teacher	Teacher, teaching, teachers	12
Improvement	Better, improve, greater, improved, improvement	10
Classroom	Classroom, class	9
Knowing	Know, knows	7
Seeing	See, seeing	6
Feeling	Emotional, feel, feeling	5
Practice	Practice, practices	5

variables affect learning perception—, years teaching ($p = .818$) and educational stage ($p = .307$) are not significant and thus removed from the model. Final closeness and school time arrangement are found to significantly affect learning perception, and initial closeness does not reach significance (Table 5). None of the two-way interactions are significant after stepwise removal. Thus, they are not included in the model.

As for initial closeness, which obtains a *p*-value of .058, marginal means show that participants that reported a high initial closeness reported a slightly lower learning perception than those with low or medium levels of initial closeness (Table 6). It is worth noting that the mean score of all subgroups remains high (i.e., above 3.2 out of 4 points).

Table 5
ANOVA with variables affecting learning perception.

Cases	Sum of squares	df	Mean square	*F*	p_{bonf}	η^2_p
Initial closeness	1.127	2	0.563	2.878	.058	0.016
Final closeness	6.281	2	3.140	16.045	<.001	0.083
School time arrangement	3.967	3	1.322	6.755	<.001	0.054
Residuals	69.681	356	0.196			

Note. Type III Sum of Squares.

As for final closeness, post hoc comparisons show that differences are significant between the three groups: the higher the final closeness, the higher the learning perception (Table 6).

As for school time arrangement, post hoc comparisons show that participants who report a maximum school time arrangement report a significantly higher learning perception than those with a lower school time arrangement (Table 6). Bivariate analyses had previously suggested that educational stage affected learning perception, but a chi-squared test between educational stage and school time arrangement indicates that the distribution is uneven ($p < .001$). A Kruskal-Wallis ANOVA with school time arrangement as the dependent variable and educational stage as the independent variable confirms significant differences between stages ($p < .001$), with post hoc comparisons showing that preschool and primary education teachers report a significantly better school time arrangement, than compulsory secondary and post-compulsory education teachers ($p_{bonf} < .001$; $M_{preschool} = 2.975$; $SD_{preschool} = 0.698$; $M_{primary} = 2.874$; $SD_{primary} = 0.832$; $M_{compulsory} = 2.229$; $SD_{compulsory} = 0.919$; $M_{post\text{-}comp.} = 2.089$; $SD_{post\text{-}comp.} = 0.880$).

A separate model was also developed for each factor of learning perception (i.e., personal learning and institutional learning). In the case of personal learning, only final closeness reaches significance ($p < .001$; $\eta^2_p = 0.051$), while initial closeness and school time arrangement do not ($p = .071$ and .091, respectively). In the case of institutional learning, both final closeness ($p < .001$; $\eta^2_p = 0.074$) and school time arrangement ($p < .001$; $\eta^2_p = 0.081$) are significant, while initial closeness is not ($p = .166$). Educational stage is not significant in any of the two models.

4. Discussion

The findings of this study indicate that voluntarily participating in

Table 6
Post hoc comparisons of learning perception based on the three independent variables.

Sample1–Sample2	Sample1		Sample2		*MD*	*SE*	*t*	p_{bonf}	Cohen's
	MM	SE	MM	SE					d
Initial closeness									
Low–Medium	3.369	0.060	3.376	0.042	−0.007	0.072	−0.099	1.000	−0.016
Low–High	3.369	0.060	3.232	0.057	0.137	0.086	1.596	.334	0.309
Medium–High	3.376	0.042	3.232	0.057	0.144	0.060	2.380	.054	0.325
Final closeness									
Low–Medium	3.029	0.083	3.382	0.041	−0.353	0.093	−3.816	<.001	−0.798
Low–High	3.029	0.083	3.566	0.041	−0.537	0.098	−5.489	<.001	−1.213
Medium–High	3.382	0.041	3.566	0.041	−0.184	0.055	−3.349	.003	−0.415
School time arr.									
1–2	3.148	0.061	3.313	0.046	−0.165	0.071	−2.306	.130	−0.373
1–3	3.148	0.061	3.315	0.046	−0.167	0.072	−2.325	.124	−0.378
1–4	3.148	0.061	3.527	0.065	−0.379	0.085	−4.480	<.001	−0.857
2–3	3.313	0.046	3.315	0.046	−0.003	0.056	−0.046	1.000	−0.006
2–4	3.313	0.046	3.527	0.065	−0.214	0.072	−2.976	.019	−0.484
3–4	3.315	0.046	3.527	0.065	−0.211	0.072	−2.939	.021	−0.478

Note. Results of each variable are averaged over the levels of the other two variables.

RPO significantly increases the closeness of professional relationship between teachers, with strong effects for those with low or medium initial levels. Such a large effect size is impressive, considering that this is a low-cost intervention which was implemented at a rather large scale (Kraft, 2020). Thus, RPO may be an efficient tool for building a collaborative culture. This study provides pretest-posttest evidence of increased closeness of professional relationship, backing up prior studies that were based on teacher perception via interviews or final questionnaires (e.g., Hall & McKeen, 1989; Motallebzadeh et al., 2017; Slater & Simmons, 2001). The lack of changes in the group with a high initial closeness may be explained by the ceiling effect, that is, the insufficient measurement precision to support distinctions between participants at the upper regions of the score scale (Ho & Yu, 2015). These findings are relevant for teacher professional development, since positive relationships among teachers play an important role in teacher motivation to learn (Vermunt & Endedijk, 2011). Thus, RPO could trigger teacher motivation for further professional learning practices.

It seems that final closeness has a medium-to-large-sized effect on teacher learning perception: the higher the level of final closeness, the higher the learning perception. In contrast, initial closeness does not reach significance in the final model. Moreover, it seems that a high initial closeness may even be slightly less beneficial than medium and low initial levels of closeness in terms of learning. The possibility that close teachers already knew each other well may explain this slight difference, although their learning perception was also high. These findings underline that closeness of professional relationship is not a prerequisite for but a product of successful collaboration. In other words, it is not necessary for teachers to have a close initial relationship to successfully participate in RPO. Rather than that, it is the participation in RPO which may result in a closer relationship that boosts learning perception. This is a relevant finding for the dissemination of RPO and teacher collaboration practices overall. In line with De Lima (2001), the findings of this study contribute to challenging the widely held belief that teacher collaboration can only be successful between teachers with strong interpersonal bonds.

It is worth noting that what teachers understand as a close professional relationship may vary greatly, given the lack of conceptual clarity in such kind of terms referring to teacher collegiality and collaboration (De Lima, 2001). Based on De Lima (2001) and Hargreaves (2019), if teachers understood a close professional relationship in terms of friendship, one might hypothesise that those participants with high initial closeness avoided disagreement and mutual critique, and instead tended to reinforce like-mindedness. Teachers' interventions in group interviews may suggest this lack of conceptual clarity, with some categories referring to professional relationship (e.g., feedback, knowledge sharing) while others refer to the personal component (e.g., personal bonds). Future studies will have to analyse whether the increase in closeness after RPO is on the right track toward teachers becoming friendly critics, as coined by De Lima (2001). According to Hargreaves (2019), professional conversations are not too comfortable neither too contrived: they are deep and demanding, but trusting and respectful at the same time. Future research could focus on the recording and analysis of RPO feedback sessions, which may shed light on this issue, as well as on teacher learning. The distinction between action-oriented and meaning-oriented reflection should be considered (Korthagen, 2017). While the former refers to what teachers do, the latter more importantly aims at understanding the underlying processes of a given situation (Mansvelder-Longayroux et al., 2007).

In this study, the effect of the RPO intervention is not significantly dependent of age, gender, years teaching, years in the school, and prior experience in PO. This encourages the use of RPO as a beneficial practice for all teachers. However, other control variables (i.e., educational stage, and school time arrangement) might influence the findings.

As for educational stage, it affects the increase in closeness with a small-to-medium-sized effect. It seems that preschool teachers might benefit more from the RPO intervention in terms of closeness than teachers from the other educational stages. There is no straightforward interpretation of this finding. Prior studies have shown differences between educational stages in terms of sources of teacher burnout (Freire et al., 2022). It seems that status-related variables predict teacher burnout in primary and secondary education teachers to a greater extent than in preschool teachers (Buunk et al., 2007). These findings suggest that teachers from different educational stages may give weight to status to varying degrees. If teachers from primary and secondary schools from this study were more focused on social status than preschool teachers, this may have limited the effect of RPO on closeness of professional relationships, since status striving may be detrimental for interpersonal relationships at workplace (Qazi et al., 2019). Although RPO between same-status teachers may minimise the significant drawbacks from one-way hierarchical peer observation carried out by managerial or academic staff (Byrne et al., 2010; O'Leary & Savage, 2020), it may well be the case that status still plays a role in RPO. Further research will have to investigate this hypothesis.

In terms of teacher learning, although bivariate analyses had also suggested an effect on learning perception, it is the underlying difference in terms of the time that schools offer for RPO meetings (i.e., school time arrangement) which affects the findings. Further analyses indicated that preschool and primary education teachers reported a significantly better school time arrangement than compulsory secondary and post-compulsory education teachers.

School time arrangement significantly affects teacher learning perception (i.e., namely institutional learning), with a small-to-medium-

sized effect, but it also influences initial closeness. Many prior studies on RPO had pointed to time constraint as a barrier (e.g., Alam et al., 2020; Bruce & Ross, 2008; Motallebzadeh et al., 2017; see Corcelles-Seuba, Soler, et al., 2023, for a review). In this study, preliminary analyses suggested that those who perceived that the school was enabling time arrangements for RPO reported a higher initial closeness. Given that the perception of school time arrangement was gathered at the beginning of RPO, it is likely that those participants who indicated a maximum school time arrangement usually have available time for collegial meetings beyond RPO, which would have allowed them to build closer collegial relationships before the intervention. These findings are in line with extant literature that defend the need of time for effective teacher collegial relationships, while reporting the actual lack of time in schools (Collinson & Fedoruk Cook, 2001; Schad, 2019; Steen-Olsen & Eikseth, 2010). Teachers express that lack of time hampers their opportunities to share with colleagues (Collinson & Fedoruk Cook, 2001). Although time alone might not be enough to change an individualist teaching culture toward a collaborative one, it is a prerequisite that needs to be accompanied by good leadership (Hargreaves, 2019). Research shows that the issue of how teachers use time within their working day generates conflicting views from the different stakeholders, including teachers, school directors, and education administrators (Steen-Olsen & Eikseth, 2010). In fact, the findings of this study suggest that highly experienced teachers may be more prone to agree that the school is providing enough time for RPO, which may reflect differences between novice and expert teachers in terms of time management. Given the role of organizational communication in school effectiveness (Collinson & Fedoruk Cook, 2001; Steen-Olsen & Eikseth, 2010), as well as in teacher job satisfaction (Schad, 2019; Shah, 2012), there is the need that education policy makers take research evidence into account for the design of infrastructural settings that support collegial time (Nordgren et al., 2021).

All in all, this study has focused on the effect of RPO on the participating teachers in terms of perceived closeness of relationship and learning. It seems that teachers can learn from RPO, especially when enough time is provided for collaboration to be successful and enable the construction of close professional relationships—which may allow teachers to become friendly critics, as coined by De Lima (2001). Future research should consider how teachers' learning perception and the construction of close relationships affect student learning outcomes.

Five limitations of this study must be considered. First, the use of a 4-point Likert scale in the items within the PeOPLe questionnaire may limit the response variability and might thus not fully capture the nuances of the participants' perceptions—although the optimal number of responses is still a matter of discussion (e.g., Simms et al., 2019). Second, despite the ecological validity of the findings, no control group was included in the research design. Future studies might consider the different kinds of control groups (Willingham & Daniel, 2021). Third, a single measure of school time arrangement was gathered at the beginning of the intervention based on teacher perception. Considering that it affects learning perception, future studies may collect this piece of information also at the end of the intervention and include other questions to gain a better insight of school time arrangement for RPO. Fourth, group interviews had three main issues: a) there were too many participants in each group interview (Finch et al., 2014; Okoko, 2023), which probably explains why most of them did not participate; b) too little time was allocated for this question, which limited follow-up questions and thorough insights (Finch et al., 2014; Okoko, 2023); and c) they were carried out online, which poses additional challenges (Gaiser, 2017). Fifth, the sample is limited to a specific geographical context (i.e., Catalonia and Balearic Islands). Thus, it is not clear whether these findings are generalizable to other contexts. Future studies might assess RPO interventions in other samples of teachers.

It is worth noting that the sample of this study was made of participants who were willing to voluntarily take part in the RPO intervention. This could lead to an overestimation of its universal effect, since the voluntary sample could be considered a subgroup that is most likely to benefit from the intervention (Kraft, 2020). However, making this kind of professional development interventions universal (i.e., compulsory) for teachers makes little sense, because it would hinder teacher agency and the sense of safety (Edmondson & Lei, 2014; Huston & Weaver, 2008; O'Leary & Savage, 2020). Instead, education policy makers should provide teachers with evidence-based information, as well as consistent support, to persuade reluctant teachers. Moreover, when reluctant teachers do not engage in RPO at first but see that some of their colleagues effectively take part in RPO, they may bring themselves to participate in future rounds, in line with potential spillover effects of collegial interactions (Sun et al., 2013).

5. Conclusions

The study provides three methodological and three empirical contributions to the field of teacher professional development. Regarding methodological contributions, a) it uses a validated single-item scale from social psychology that may be used in future studies as an easy-to-use instrument for systematic data collection about teacher interpersonal relationships, b) it reports the creation and validation of a six-item questionnaire to assess teacher learning perception after RPO, but also after other teacher collaboration practices, and c) it exploratorily uses group interviews to gather teacher interpretations of one of the findings, in line with participant validation in member checking (Birt et al., 2016; Madill & Sullivan, 2018) and citizen science (Roche et al., 2020).

As for empirical contributions, a) it provides pretest-posttest evidence of increased closeness of professional relationship after RPO, with educational stage as a significant variable affecting the increase, b) it shows that, rather than initial closeness as a prerequisite, it is final closeness which significantly affects teacher learning perception, and c) it underlines the relevance of schools offering the necessary time for RPO. All in all, as a job-embedded practice (Parise & Spillane, 2010; Zepeda, 2014), RPO can provide a structured procedure to cater to the different learning needs of different teachers, which seems a relevant factor for effective teacher professional development (Korthagen, 2017; Sancar et al., 2021).

Summing up future research directions, further studies should mainly focus on a) how teachers conceptualise closeness of professional relationships, b) the role of status in RPO, c) the use of other research designs (e.g., control-group designs) and data collection instruments (e.g., recordings of the feedback sessions), d) the replication in other contexts and samples of teachers, and e) the potential impact of RPO on student learning outcomes.

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CRediT authorship contribution statement

Jesús Ribosa: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Supervision, Visualization, Writing - original draft, Writing - review & editing. **Ingrid Noguera:** Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Visualization, Writing - original draft, Writing - review & editing. **Meritxell Monguillot:** Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Visualization, Writing - original draft, Writing - review & editing. **David Duran:** Conceptualization, Funding acquisition, Investigation, Methodology, Project administration, Writing - review & editing.

Declaration of competing interest

The authors declare no conflict of interest.

Data availability

Data will be made available on request.

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