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The importance of socio-affective relationships in educational contexts: Validation of a closeness-conflict scale and a motivational communication scale

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The Importance of Socio-affective Relationships in Educational Contexts: Validation of a Closeness-conflict Scale and a Motivational Communication Scale

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Abstract

In studies on the motivational classroom climate the need to delve into socio-affective aspects that make up the pedagogical relationships -PR- between teachers and students that affect the closeness and communication is recognized. That is why this work seeks to validate the design of two evaluation instruments focused on PR (Closeness/Conflict Scale and Motivational Communicational Scale) applied to 459 students from technical secondary schools (Argentina) and establish links with the CMC as well as with the satisfaction and interest achieved in terms of the relevance of school learning. The results found to prove that the two assessment scales created meet measurement guarantees, showing encouraging reliability, internal, convergent and predictive validity data. Likewise, the relationships between the Motivational Communication and Closeness scales are strong since significant correlations were found. The relationship model between communication/closeness/conflict turned out to explain the satisfaction that students perceive of their teachers, demonstrating the importance of the main determinants of PR (closeness, communication and conflict) for the CMC and contributing to the evaluation of educational interventions focused on improving the climate.

Keywords: pedagogical relationships, closeness/conflict, motivational communication, motivational classroom climate

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La Importancia de las Relaciones Socio-afectivas en los Contextos Educativos: Validación de una Escala de Cercanía-conflicto y una Escala de Comunicación Motivacional

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Resumen

En los estudios sobre el clima motivacional de clase se reconoce la necesidad de profundizar en aspectos socio-afectivos que configuran las relaciones pedagógicas -RP- entre docentes y estudiantes que afectan la cercanía y la comunicación incidiendo así en el aprendizaje. Es por ello que se busca validar el diseño de dos instrumentos de evaluación centrados en las RP (Escala Cercanía/Conflicto y Escala Comunicacional Motivacional) aplicados a 459 estudiantes de escuelas secundaria técnicas (Argentina) y establecer vinculaciones con el CMC como así también con la satisfacción y el interés en el aprendizaje escolar. Los resultados hallados comprueban que las dos escalas de evaluación creadas reúnen garantías de medida mostrando datos de fiabilidad, de validez interna, convergente y predictiva alentadores. Asimismo, las relaciones entre las escalas de Comunicación Motivacional y Cercanía son fuertes ya que se encontraron correlaciones significativas. El modelo de relaciones entre comunicación/cercanía/conflicto resultó explicar la satisfacción que perciben los/as estudiantes de sus docentes demostrando la importancia que tienen los principales determinantes de las RP (cercanía, comunicación y conflicto) para el CMC y contribuyendo a la evaluación de la eficacia de intervenciones educativas centradas en la mejora del clima.

Palabras clave: relaciones pedagógicas, cercanía/conflicto, comunicación motivacional, clima motivacional de clase

For some time now, within the framework of research that shows the importance of rigorously studying the role of context in the motivation for school learning, the importance of interactions, the affective accompaniment, and the emotional support that teachers¹ give to students in the context of socio-affective relationships has been recognized, promoting motivational class climates (CMC).

Teachers adopt what are defined as pedagogical relationships (PR) considering that the modes of interaction in the school context are conceived as training processes. Throughout this paper, the term PR will be used in this sense. Thus, we will show how teachers and students are subjectively affected when they participate in different teaching and learning contexts through forms of affiliation and proximity based on trust, situated support, concern for commonality, and ways of being with others. PR demands social mediations with a cognitive and affective character from teachers in order to promote the access of students to certain objects and cultural knowledge through teaching practices and their relational character, thus promoting learning processes that lead to the construction of new meanings. In this sense, PR are characterized as being asymmetrical and non-permanent, given that teachers are usually in control of these interactions and, by its nature, this relationship tends to end and even disappear according to school times.

Within the framework of studies on CMC, aspects linked to socio-affective relationships have been included, in one way or another, in the process of the PR construct. Let us recall that CMC arose to address the study of what happens in the classroom as a whole. Ames introduced it in 1992, taking the contributions of Epstein (1989) to systematize different factors that explained students' interest, effort, learning and satisfaction. Thus, for example, Ames defined that the most important elements for generating a good learning climate were to be found in teaching actions related to the organization of tasks, authority, recognition, groupings, evaluation and time -the TARGET model-, reinforcing a perspective centred on the goal structures of the classroom (Kaplan et al., 2010). The proposal made by Ames was very relevant for subsequent developments on CMC focused on promoting a learning orientation (Alonso Tapia, 2012), as well as improving the academic performance (Schwinger et al., 2016) and decreasing the disruptive and conflictive situations of school coexistence (Simón & Alonso Tapia, 2016). The great drawback of

this perspective is that it focused almost exclusively on instructional actions aimed at organizing the teaching practice, do not contemplating the aspects of RP in a specific and developed way. For example, Alonso Tapia & Fernández (2009, 2008) defined sixteen teaching strategies within CMC. The strategies that related the most with PR were emotional support and help, fairness of treatment and use of praise. Over the years, several self-reports have been developed to measure CMC with acceptable psychometric properties that showed high levels of reliability such as the Scale based in the TARGET model (Ames, 1992), the Patterns of Adaptive Learning Survey (PALS; Midgley et al, 2000), the Classroom Goal Structures Questionnaire 3x2 (CGSQ; Elliot & Thrash, 2001), the Motivational Orientation and Climate Scale (MOC-S; Stornes et al, 2008) and the Motivational Climate in the Classroom Questionnaire (CMCQ; Alonso Tapia & Fernández, 2008). In our opinion, the CMCQ is the instrument with the most validation studies (Alonso Tapia & Fernández Heredia, 2009; Villasana & Alonso-Tapia, 2015; Alonso Tapia et al., 2020).

Fifteen years after the design and cross-cultural validation of the reliability and applicability of the CMC assessment instrument developed by Alonso Tapia & Ruiz (2007) it is recognized that this is a good assessment tool that can be used to plan interventions and improvements in the teaching practice from collaborative assessment (e.g., Alonso Tapia, 2017; Huertas, et al., 2020). Among the components of the CMC, there are many that are nowadays key in current didactic discussions. Some of them are autonomy and its relation to the organization of conditions that guide learners to have genuine opportunities for choice (Lazowski & Hulleman, 2016); feedback and its relation to formative assessment (Fraile Ruiz et al., 2017); the value of learning through relevant problems and projects that work with novelty (Lazonder & Harmsen, 2016).

As mentioned before, the scientific literature of the recent decades has begun to study, with some profusion, the different aspects of PR that generate a good learning climate. Thus, for example, there are the papers that highlight the role of teachers' emotions (Pekrun & Linnenbink-Garcia, 2012) and, in general, of the affective relationships as factors that influence the quality of school activities (Pintrich & Schunk, 2006). In this regard, certain aspects such as the sense of community, the warmth and courtesy of personal relationships and the feelings of teachers and students about personal safety in the classroom context are highlighted. In this sense, it is considered that well-organized and emotionally safe environments have an impact on PR facilitating the

involvement through expressing ideas and opinions and assuming challenging goals, away from fear and anxiety.

The developments focused on socio-emotional aspects allow us to confirm their relevance in CMC by advancing in the ways teachers build support within the framework of their teaching practices to make learning a meaningful experience. Evans et al. (2009) recognize the existence of the emotional classroom climate by analysing the importance of fairness, respect, sensitivity, consideration of students' beliefs and interests, and the establishment of clear and consistent boundaries in the emotional involvement of teaching. All these ways for teachers to build presence and support appeal to forms of accompaniment that require self-regulation and are reduced to teaching competencies such as emotional rapport, emotional awareness, emotional training, intrapersonal emotional beliefs, and interpersonal patterns of emotional performance.

The above reaffirms what has been exposed by Meyer & Turner (2002) regarding the need to incorporate the study of emotional factors as mediators of the perception of classroom climate; however, it is recognized that their approach should distance itself from proposals based on teachers' competency-based learning in initial or continuous training. These leave the concern and interest in the ways of relating at the mercy of the teacher, and this is even limited as an individual and arbitrary responsibility. On the contrary, it is proposed to focus the discussion about PR and CMC on the closeness between teachers and students as a way of building, sustaining and strengthening bonds, generating learning situations where motivation for learning is encouraged to the maximum. It is considered that closeness integrates the conditions that favour a classroom climate and that this affects the consolidation, type and intensity of PR as social relations mediated by activities, knowledge and discursive messages that organize the possibilities and limits of classroom interactions.

It should be noted that the concept of closeness presents developments in the psychological field that act as antecedents. On the one hand, there are studies linked to persuasion in the field of social psychology, such as Briñol Tunes et al. (2017). As well, the evolutionary psychology takes up the notion based on the relevance of attachment in maternal-filial relationships. The vision proposed in this article is much more closely linked to the educational context.

Mehrabian (1981) introduced the concept of closeness -also called immediacy- to account for an intersubjective construction between teachers and students. Closeness implies taking care of the sufficient degree of affection that teachers have for the situations and students involved, in order to be able to intervene. The awareness of this closeness functions as a warning in a necessarily asymmetrical relationship that requires an authentic, genuine and affective presence. Pianta & Hamre (2001) have incorporated the concept of closeness to define PR through teaching actions, practices and gestures based on warmth, affection and fluid and open communication with students and have shown that emotional closeness is a key factor for school learning. They contrast closeness relationship with those that are conflictive, tension-generating, aggressive interactions with communication difficulties. On the other hand, they note dependent relationships, i.e., exaggerated emotional reactions on the part of students to particular situations such as separation or the permanent demand for assistance that overload teachers and may even saturate them.

To this end, they designed a questionnaire that measures the quality of the relationship between teacher and students in terms of closeness, dependence and conflict. The original instrument is oriented to early childhood and primary education and assesses the teacher's perception of the relationship with each of his or her pupils (Pianta, 2001). It consists of 28 items; 12 on the conflict subscale, 11 on closeness and 5 on dependence, based on a 5-point Likert scale, from 1 (strongly disagree) to 5 (strongly agree). The study by Moreno García & Martínez Arias (2008) in Spain revised and improved the instrument, incorporating a global and general view of students per grade in Spanish that achieved good psychometric properties. Studies such as these have shown that closeness to the teacher leads to greater satisfaction, involvement, cognitive self-regulation, academic performance, reduced discipline problems in students and improvements in social competence (Pianta & Allen, 2008; Rivers et al., 2013).

There are factors that modulate these effects of closeness such as the age of the students, the number of students per group-class and the type of teaching position held by the teachers (Ruzek et al. 2016). Ginsberg (2007) links closeness to a group of communication traits that increase the physical and psychological perception of proximity with students and enhances interest in learning. In this sense, communication is presented as a key factor in PR since it allows the generation of an eminently relational climate. According to

Huertas (2012), building closeness implies that teachers present themselves as a resource for learning, i.e., as a help for learning by being close to the students' interests when communicating. In this sense, emotional aspects such as support, security, interest and trust allow teachers to generate closeness when teaching through different verbal and nonverbal modes of communication (Reeve & Jang, 2006). Being close, therefore, is possible through active listening and constant feedback that favors comprehension and continuous understanding between teachers and students, that promotes trust in the exchanges they have, and that organizes school work in such a way as to reduce uncertainty, providing clear anticipations and orders (Alonso Tapia & Nieto, 2019). In this regard, Ruzek et al. (2016) and Joe et al. (2017) delve into the communicative aspects of closeness and recognize that nonverbal language is relevant, as well as clarity in messages, the use of examples, synthesis and anticipations and humour. Likewise, Huertas & Montero (2001) state that educational discourse also influences PR, referring to the importance of the messages that teachers transmit when they carry out school activities. In this regard, they recognize that the discourse is not always related to curricular content, but also implies providing a space for conversation about the learning process and even attitudes towards it. In reference to the above, Rompelmann (2002) emphasizes the importance of feedback in proximity, reinforcing some dimensions of CMC already mentioned, such as the use of praise and equitable treatment. In the framework of empirical studies carried out in recent years, we have not found standardised self-reports on motivational aspects of communication. We note that questionnaires or ad hoc surveys abound (Ferres & Masanet, 2017).

In this line, several meta-analysis studies such as the one conducted by McMahon et al. (2017) have highlighted that there are certain aspects of PR that strongly influence climate. Thus, on the one hand, it is achieved by facilitating learning by favouring students' interest, effort and satisfaction with school work, in addition to psychological well-being in adolescence (Liu et al., 2016). On the other hand, it is achieved through the improvement of the climate to increase the commitment that the teachers themselves have with teaching, avoiding affecting their work with stress or abandonment during the first years (Martínez et al., 2016). In this sense, the emotional implications of the teachers' ways of acting towards students in relational terms contribute to build a broader vision of what happens in the classrooms for the purpose of designing

evaluation instruments and intervention programs from collaborative counselling.

What has been mentioned so far allows us to infer that building closeness implies promoting caring relationships and emotional support through open communication and other actions focused on providing instructional support in the framework of assessment and intervention on CMC (Alonso Tapia, 2017). In short, the closeness shown by teachers and the communicative vehicle they use may be the key to achieving different climates. However, in the framework of psychoeducational and didactic research, there are no studies that specifically show the existing relationships between closeness, conflict, communication and CMC, considering the aspects they have in common but also the particularities that enrich their conceptual approach, evaluation and psychoeducational intervention.

It should be noted that this gap is relevant at secondary education levels where the generational differences between adolescents and young people and adults result in a priori distance to build socio-affective relationships, in addition to other distances in PR that result in the lack of meaning found in learning and situations of violence in the classroom that break the possibilities of encounter and interaction (Erturk Kara et al., 2017).

Considering all of the above, this study seeks to contribute to the exploration and analysis of CMCs through the creation and validation of evaluation instruments focused on PR between teachers and students. It seeks to give continuity to studies already initiated in Argentina (Bardelli, 2017) from the perception that students that also include satisfaction and interest achieved in terms of the relevance of school learning.

Method

The main objective is to design and validate self-report instruments that allow us to know key aspects of PR in education, specifically the relationships of teacher closeness and motivational communication. This study shows the measurement guarantees offered by these instruments, their reliability, validity and relationships with other constructs such as CMC. As specific objectives we propose to: i. design and analyze the psychometric properties, internal validity and convergent validity of two scales focused on PR. The first one is a motivational communication scale that assesses the verbal and nonverbal strategies teachers frequently use to transmit knowledge and evaluations in a

more warmly manner. The second self-report is the adaptation to high school students of a previous one of closeness, conflict and dependence (Moreno García & Martínez Arias, 2008); ii. compare the two scales created with the motivational classroom climate questionnaire, CMC-Q (Alonso Tapia & Fernández, 2008) and the relationships that are established. It is expected to find strong relationships between the CMC-Q and the new scales of closeness-conflict and motivational communication, but they will not be higher than what the literature establishes that indicates that they are part of the same construct.

Correlations are expected to be less than .708. If the correlation between two variables is less than .708, those variables assess different constructs, given that the variance explained (R^2) is less than 50%. It is thought that the emotional aspects inquired in the instruments created are part of the climate, but are not sufficiently represented in the CMC; iii. to perform a predictive validity analysis to recognize the relationships of the scales of motivational communication and closeness-conflict with each other with a scale of satisfaction and interest of the students in the teacher's work. The hypothesis underpinning these objective focuses, on the one hand, on the existence of a single general theoretical construct that explains the set of factors immersed in PR and brings us closer to the recognition of a socio-affective model in educational contexts. On the other hand, the relevance within the PR of differential characteristics between teacher closeness, motivational communication and CMC. Likewise, we want to know the predictive value that closeness and communication have on the interest and satisfaction shown by students.

The achievement of these goals will make it possible to have short and simple evaluation instruments to administer to students in the school context that complement the CMC analysis. This is considered relevant in view of outlining guidelines to help teachers achieve improvements in their teaching practices in order to promote motivating learning environments within the framework of the pedagogical counselling processes that take place in school guidance.

Participants

The total sample comprised 459 students from secondary technical schools¹ in the province of Neuquén, Argentina, with six-year curricula in electronics and

agriculture. The age ranged from 13 to 18 years, 187 were females and 272 were males.

Instruments

Closeness-Conflict Scale

It focuses on the relationship between the teacher and the students from the latter's perception. Taking as a reference the instrument of Moreno García & Martínez Arias (2008), we made a first adaptation to secondary education was carried out with a sample of 485 students of regular secondary school in the province of Neuquén, whose instrument had 15 items. With the results obtained, the questionnaire was modified, leaving it with 8 items, 5 related to closeness and 3 to conflict, which are answered with a 4-point Likert frequency scale from 1 (never) to 4 (always). The original dependence scale was discarded due to the psychometric inconsistencies found.

Motivational Communication Scale

The design was made taking as a reference what many works on emotional classroom climate mentioned about the role of teacher communication. In the same way as in the closeness-conflict scale, a first version of the motivational communication scale was applied to students from 485 regular high schools and the analysis confirmed the validity structure of the 10 items that are answered with a 4-point Likert frequency scale from 1 (never) to 4 (always)² and that allows obtaining a direct score. The 10 items are grouped in pairs in 5 dimensions that characterize the motivational communication mode of the teacher with his/her students: i. the use of non-verbal language (items 1 and 4), ii. the precision and relevance of the vocabulary (items 2 and 8), iii. the effects of communication (items 3 and 5), iv. the mood (items 6 and 9), v. the context of the communicative interaction (items 7 and 10).

Classroom Motivational Climate Questionnaire (CMC-Q)

This questionnaire evaluates 16 types of teaching strategies or patterns that can affect students' motivation to learn. In the original instrument (Alonso Tapia & Fernández, 2008) each pattern is evaluated by 2 items, one positive and one

negative, and is answered on a 5-point Likert scale of agreement, from 1 (complete disagreement) to 5 (complete agreement). The items are grouped to obtain 16 indicators, from which the overall score that evaluates the motivational classroom climate is obtained.

Satisfaction and interest scale

We generated a scale based on previous Jesus instruments to assess these two aspects (Abello et al., 2021). Taking into account that students' motivation is sensitive to emotional aspects linked to closeness that affect their expectations, a specific scale was designed for this stage. The version used here evaluates two dimensions related to satisfaction and interest in teaching work, each integrated by 2 items with a 4-point frequency Likert scale from 1 (never) to 4 (always).

Procedure

The scales and questionnaires were applied in 2 face-to-face sessions of 30 minutes with an interval of up to 7 days. It should be noted that in order to carry out this study, the corresponding authorizations were requested in the two schools involved, both from the management teams and from the teachers who gave up their classrooms to carry out the administrations. In all cases, the participation of the students was voluntary and with the corresponding informed consent signed by their tutors. This research was also approved by the Ethics Committee of the UAM.

Statistical analysis

Once the data were collected, cases with missing values were eliminated. The analyses on the motivational communication scale consisted of the study of reliability and the collection of three sources of validity evidence based on AERA, APA and NCME (2014) standards: 1) internal structure, through confirmatory factor analysis and multigroup analysis -to study invariance by gender-; 2) relationship with other variables, through contrasts on Pearson correlations; and 3) predictive, applying path analysis. For the factor analyses, the following cut-off points were used for the goodness-of-fit indices (Hair,

2014): $X^2/df < 5$; CFI $> .96$, TLI $< .96$, RMSEA $< .08$, 90% confidence interval of RMSEA includes the value $.05$, SRMR $< .05$. If some of the cut-off points are met and some are not, the fit will be considered acceptable, but not good, as long as the CFI and TLI values are not less than $.90$ and the lower limit of the RMSEA confidence interval is less than $.08$.

Since the wording of the items was modified to adapt them to the study population, the factor structure of all questionnaires was tested to ensure the validity of the interpretation of their scores. For the motivational communication scale and the CMC-Q, pairs of direct and inverse items measuring the same construct were summed to obtain item parcels. Therefore, the scale and the questionnaire mentioned above have 8 categories item parcels, so they were treated as continuous variables. Both the data processing and the analyses were carried out using the statistical software R (R Core Team, 2021) and the packages weights (Pasek & Tahk, 2021), tidyverse (Wickham et al., 2019), MVN (Korkmaz et al., 2014), lavaan (Rosseel, 2012), psych (Revelle, 2021) and semTools (Jorgensen et al., 2021).

Results

Validity Evidence Based on Internal Structure

First, multivariate normality was tested using different statistics (Mardia's skewness and kurtosis, Royston's H, and the Henze-Zirkler statistic), the results of which are shown in Table 1. Since a significant value was obtained in all tests, it was concluded that the items of the communication scale and the CMC-Q did not have a multivariate normal distribution.

Table 1
Multivariate Normality Analysis

	Motivational communication		CMC-Q	
	Statistic	p	Statistic	p
Mardia asymmetry	486.65	$< .001$	2112,27	$< .001$
Mardia Curtosis	6.38	$< .001$	24.90	$< .001$

	Motivational communication		CMC-Q	
Royston	933	< .001	1255.15	< .001
Henze-Zirkler	1.54	< .001	1.38	< .001

Communication Scale

Confirmatory factor analyses of the communication scale were then conducted using robust maximum likelihood method (MLR). The 1-factor model has a good fit to the data according to the robust fit indices ($\chi^2 = 18.042$, g.l. = 5, $\chi^2/\text{g.l.} = 3.608$, CFI = .981, TLI = .962, RMSEA [95%CI] = .075[.04, .114], SRMR = .027). Table 2 presents the factor loadings of the indicators, all with an unstandardized value significantly different from 0 and with a high standardized value (between .618 and .828). A single factor was obtained and the percentage of variance explained reached 51%.

Table 2
Factor Loadings of the Confirmatory Factor Analysis based on Covariance Matrix of the Communication Scale

Item Parcel	Unstandardized Loadings [SE]	Z	Standardized Loadings	Communality
Motivational effect	1.000[-]	-	.803	.645
Vocabulary	.871[.062]	14.045*	.709	.503
Non-verbal language	.981[.061]	15.950*	.784	.615

Item Parcel	Unstandardized Loadings [SE]	Z	Standardized Loadings	Communality
Humor	.781[.062]	12.538*	.622	.387
Interaction context	.759[.058]	13.057*	.622	.387

Note. A single factor, explained variance: 50,7%.

Regarding invariance based on gender, four multigroup confirmatory models were used as reported in Brown et al. (2015): configural (unrestricted), metric (equal loadings), scalar (equal loadings and intercepts) and strict (equal loadings, intercepts and error variance). Table 3 shows that all models have a good fit, with strict invariance being the best.

Table 3
Robust Fit Indices of the Factor Invariance Models by Gender

Model	χ^2 (g.l., p)	χ^2 /g.l.	CFI	TLI	RMSEA [IC 95%]	SRMR
Configural	23.537 (10, .009) *	2.354	.980	.961	.077 [.037, .117]	.026
Metric	24.662 (14, .038) *	1.762	.985	.978	.058 [.014, .094]	.030
Scalar	31.600 (18, .025) *	1.756	.980	.978	.057 [.021, .090]	.035
Strict	34.188 (23, .062)	1.486	.984	.986	.046 [.000, .076]	.036

Note: *p < .05.

As the four invariance models are nested, we tested if differences in their fit to data were negligible using likelihood ratio tests. Table 4 shows that all differences are non-significant, concluding strict invariance is the best model.

Table 4
Likelihood Ratio Test for Gender Invariance Models

Model	χ^2 (g.l.)	AIC	BIC	χ^2 difference (g.l.)	p
Configural	23.710 (10)	5180.262	5304.133	-	-
Metric	25 (14)	5173.551	5280.907	1.252 (4)	.869
Scalar	32 (18)	5172.552	5263.391	6.938 (4)	.139
Strict	34.597 (23)	5165.148	5235.342	2.572 (5)	.766

Closeness-Conflict Scale

The adapted scale consisted of 4 categories items, so they were analyzed using weighted least squares mean and variance adjusted (WLSMV) based on polychoric correlations matrix, as recommended (Lloret-Segura et al., 2014). As can be seen in Table 5 fit-indices are good for the two factor (closeness-conflict) model but not acceptable for the CMC-Q one factor model.

Table 5
Robust Goodness-of-Fit Indices of the Scales

Scale	χ^2 (g.l.)	χ^2 / g.l	CFI	TLI	RMSEA [IC95%]	SRM R
Closeness Conflict	89.708(26)**	3.450	.971	.960	.073 [.057, .090]	.053
CMC-Q	394.599(104)**	3.794	.906	.892	.078 [.071, .085]	.051

Note. **p < .001.

Reliability of the Scales

Given that the scales had a unidimensional structure, reliability, as internal consistency, was calculated using Cronbach's alpha index. For this purpose, students were grouped into 3 educational levels (1st/2nd, 3rd/4th and 5th/6th) and the index was calculated for them and for the total sample. Table 6 shows the reliability indices. Note that the results should be interpreted according to the number of items in each scale. We see that the values are adequate for Motivational Communication and Closeness (around .80) and decrease for Conflict (.57). In the latter case, low reliability may be due to the reduced number of items in the scale, just 3. Moreover, reliability is lower at the first educational level.

Table 6
Internal Consistency Indices of Communication, Closeness and Conflict.

School year	N	Motivational Communication	Closeness	Conflict
1º/2º	220	.793	.737	.564
3º/4º	126	.864	.781	.677
5º/6º	113	.916	.857	.595
Total	459	.853	.781	.605

Note. The number of items (J) of the scales is: J_{COM} = 10, J_{CLO} = 6 y J_{CON} = 3.

Validity Evidence based on Relation to Other Variables

Sum scores of the scales were calculated to obtain the Pearson correlation matrix, which is presented in Table 7. Also, the table includes whether the value is significantly different from 0, contrasted by normal approximation.

Table 7
Correlations of the Scales in Secondary Technical Education

	Mean	SD	CMC	Motivational communication	Closeness	Conflict
CMC	49.221	9.236	1			
Motivational communication	14.113	3.449	.781**	1		
Closeness	15.941	4.167	.736**	.721**	1	
Conflict	5.229	2.231	-.635**	-.604**	-.487**	1

Note. * $p < .05$, ** $p < .01$. N = 459. SD = standard desviation.

All correlations are statistically significant and of moderate intensity, between .487 and .781 in absolute value. With respect to the conflict scale, the correlations are negative with the rest of the scales, consistent with what is theoretically expected. Regarding the CMC-Q, the correlations should be interpreted with caution since the factor analysis did not present an adequate fit for the unidimensional model, which may affect the quality of the overall score. As can be seen, the relationship between CMC-Q and Motivational Communication is positive and high (.781), but not too high, as expected since each instrument operationalizes CMC in slightly different ways.

In order to explore the differences and similarities between CMC-Q and Motivational Communication, an exploratory factor analysis was carried out on the subscales of both questionnaires simultaneously by the ULS estimation method. The two-factor solution obtained an acceptable fit ($\chi^2(g.l.) = 341.803$ (169), $\chi^2/g.l. = 2.023$, TLI = .903, RMSEA[95%CI] = .073 [.067, .079], SRMR = .05). The factor loadings are presented in Table 8.

Table 8

Standardized factor loadings for the exploratory factor analysis on the subscales of Motivational Communication and CMC-Q.

Scale/ Questionnaire	Item Parcel	F1	F2	Communality
Motivational communication	Motivational effect	.73	.04	.57
	Vocabulary	.42	.35	.52
	Non-verbal language	.59	.15	.50
	Humor	.54	.13	.42
	Interaction context	.69	-.09	.39
	Autonomy	.58	.11	.44
	Evaluation of learning	-.01	.54	.29
	Background knowledge	.57	.24	.59
	Step-by-step	.36	.41	.51
	Participation	.68	-.01	.45
CMC-Q	Emotional support	.79	-.01	.61
	Appropriate rhythm	.48	.31	.55
	Equity	.58	.15	.49
	Feedback	.88	-.10	.66
	Use of compliments	.77	-.01	.58
	Relation of lessons	.70	-.03	.47
	Use of example	.26	.17	.16
	Clear objectives	.10	.62	.49
	Organization	.01	.83	.69
	Learning message	.82	-.03	.64
	Use of novelty	.66	-.05	.39

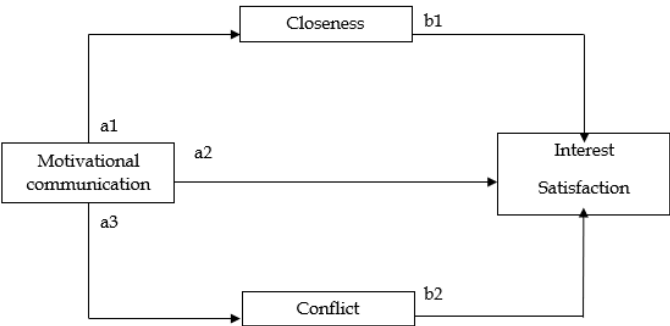
Note. Correlation F1-F2 = .74

Regarding the Motivational Communication subscales, all of them obtained loadings higher than .30 in the first factor; the vocabulary subscale (VOC) obtains a weight higher than .30 also in the second factor, although of lesser magnitude than in the first factor (1F1=.42, 1F2=.35). As for the CMC-Q subscales, ten (10) of them obtained loadings greater than .30 on the first factor, two (2) of them also on the second factor, and three (3) subscales only weighted on the second factor. The subscale of use of examples does not obtain loadings higher than .30 in any factor. Finally, the correlation between both factors was .74, indicating that both factors share 55% ($R^2 = .55$) of the variability.

Evidence of Predictive Validity

Regarding predictive validity, two mediation models were proposed by using path analysis, which follow the diagram shown in Figure 1. These are two predictive models in which the direct and combined predictive capacity of the three questionnaires are studied over the responses to a question of interest and another of satisfaction with teaching practice. We proposed a different model for both questions as their correlation was not high (.553). In the path analysis the following effects are included: 5 direct effects (a1, a2, a3, b1 and b2) and 2 indirect effects of Communication on the satisfaction question through Proximity (a1-b1) or Conflict (a3-b2).

Figure 1
Mediation model



Note. (a1, a2, a3, b1 y b2) = direct effects; (a1-b1) y (a3-b2) = indirect effects.

Table 9 presents the results of the direct and indirect effects. First, Motivational Communication is a significant predictor of Closeness (a1 = .721, R² = .520) and Conflict (a3 = -.604, R² = .365) in both questions. Only Closeness has a significant direct effect also on both questions (.48 on interest and .58 on satisfaction). It is worth noting that there is a combined effect of communication/closeness on interest (a1, b1= .35) and somewhat higher on satisfaction (a1, b1= .40). Finally, the relevance model explained 24.0% of its variance, and the satisfaction model explained 39.5%.

Table 9
Direct and indirect effects of mediation models

Direct effects					
Outcome	Predictor	Effect [SE]	Z	p	Standardized Effect
Interest	Motivational communication (a2)	.007[.020]	.361	.718	.024
	Closeness (b1)	.124[.015]	8.329	< .001	.489
	Conflict (b2)	.020[.024]	.805	.421	.041
Satisfaction	Motivational communication (a2)	.025[.017]	1.479	.139	.088
	Closeness (b1)	.134[.012]	10.790	< .001	.565
	Conflict (b2)	.003[.020]	.134	.893	.006
Closeness	Motivational communication (a1)	.871[.039]	22.278	< .001	.721
Conflict	Motivational communication (a3)	-.390[.024]	-16.226	< .001	-.604
Indirect effects					
Outcome	Predictor	Effect [SE]	Z	p	Standardized Effect
Interest	Communication-Closeness (a1-b1)	.108[.014]	7.802	< .001	.353
	Communication-Conflict (a3-b2)	-.008[.009]	-.804	.421	-.025

Outcome	Predictor	Effect [SE]	Z	p	Standardized Effect
Satisfaction	Communication-Closeness (a1-b1)	.117[.012]	9.711	< .001	.407
	Communication-Conflict (a3-b2)	-.001[.008]	-.134	.893	-.004

Discussion

First of all, it should be noted from the analyses presented those two instruments have been adapted and created for the assessment of RP in the secondary classroom that meet many measurements guarantees. Both the Motivational Communication scale and the Closeness/Conflict scale show very encouraging reliability, internal, convergent and predictive validity data.

The Motivational Communication scale measures jointly the quality of teaching messages with only 10 items. The items with the highest saturation in the factor found are those referring to the effects of the communication (if the teacher's talk interests me, amuses me, bores me), those describing the type of nonverbal language used (gestures and tones that help to attract attention and interest) and the vocabulary for learning the subject.

The adaptation of the Proximity/Conflict Scale has resulted in another brief instrument with remarkable psychometric indicators. It also evaluates the students' perception of the degree of proximity with the teachers, their warmth, receptiveness and help for learning, as well as the degree of conflict, the degree of discomfort and exhaustion that teachers sometimes provoke.

As expected, the relationships between these two scales are strong, given that significant correlations of around .72 were found. They therefore share a common variance of 51%. Therefore, they capture the same construct that coincides well with aspects included in the literature within what has been called the PR, but each one adds differential nuances that, depending on the use to which they are put, may be interesting to consider separately. The proximity aspect focuses on the proximity of the teacher/student relationship

and the communication aspect on how these links are based on a series of communicative resources.

It was assumed that these instruments would show moderate relationships with the class motivational climate. They are slightly above what was expected (between .73 with closeness and .78 with communication), slightly higher than what is established in the literature for considering them distinct constructs (.70). It should be borne in mind that the data we obtained from the CMC-Q show that the factor analysis does not present such an adequate fit for the unidimensional model. It is therefore desirable that new studies corroborate or refute these relationships. In any case, it seems that the three instruments share much in common, the set of aspects that affect CMC and the PR that occur in a secondary school classroom. We note from the findings that the study of PR needs to be further expanded, delimiting with greater specificity its importance and impact on learning processes (Ferrés & Masanet, 2017). In this sense, the motivational classroom climate measured with a single instrument pose limitation. We believe it is necessary to expand the evaluation of the same focusing on closely related aspects such as motivational communication and closeness/conflict.

The study is completed by establishing a system to determine the predictive validity of the new questionnaires. For this purpose, two measurements of student perception were used: the one that highlights the interest generated by their teaching and the general satisfaction with the professors. The communication/ closeness/conflict relationship model was found to explain a significant percentage of the variance, 44% in the case of students' perceived satisfaction with their teachers. The role of the main determinants of PR (closeness, motivational communication and conflict) is evident in their importance for classroom climate. Of the instruments, the one with the greatest predictive capacity is the closeness scale. This is the one that reflects the quality of relationships and seems to offer a general view of PR. The motivational communication scale qualifies and provides information on how these relationships are conveyed for better or worse.

Conclusion

The main objective of the design of these instruments was supporting and evaluating the effectiveness of a series of educational interventions that are being carried out in these secondary school settings to improve CMC. The data

that are being collected in this regard coincide with the contributions that are being obtained through interviews and observations with the educational agents involved in these interventions.

It cannot be overlooked that the sample has a specific component. These are students from technical secondary schools. In any case, studies on the use of these instruments should be extended to other environments outside the technical school. It may be that closeness and motivational communication are built more naturally in schools linked to the world of work.

Among the limitations that we found in this study, we have already mentioned the need to deepen the study of motivational communication and its relationships with the scales that make up the CMC. It would be good if these new studies are based on other types of instruments such as classroom observation or interviews with students and teachers. Likewise, the low levels of reliability found in the Conflict Scale in all school years is presented as a limitation of this work. We consider that it is important to continue reviewing the design of the Conflict Scale, given that the results achieved in proximity encourage us to think about PR within the framework of these two affective modalities between teachers and students. Finally, this study is limited to technical education, an orientation of secondary education that presents singularities in the organisation of its pedagogical and curricular proposal. This makes it necessary to extend this study to other orientations and forms of school work at this level of education, considering other educational contexts in Argentina and Latin America.

In short, this study is considered to provide more of evidence on how to assess PR in secondary classrooms that will serve to complement studies of intervention and improvement of classroom climates.

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Notes

¹ Technical secondary schools in Argentina are a modality within the secondary level of the education system that is part of compulsory schooling according to Law 26.206. The institutional and curricular proposal seeks to achieve a comprehensive training for young people, which requires a close link to the labour market.

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