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SCHOOL CLIMATE EVALUATION: DESIGNING AND VALIDATING MEASUREMENT INSTRUMENTS

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Abstract

This study aims to present the process of designing, testing and validating measurement instruments to measure the school climate from the perspective of students from the 7th grade of primary education onwards, as well as their teachers and managers. We reviewed the national and international literature on the subject, built the concept, the reference framework formed by eight interrelated dimensions and the measurement instruments. Based on a sample of 11,516 respondents, we carried out the statistical and qualitative analyzes concerning the validation process: evidence content and construct validity. The dimensions and their respective items indicated good componential load and good reliability indices, which validates the measurement instruments.

SCHOOL ENVIRONMENT • MEASUREMENT INSTRUMENT • VALIDITY

EVALUACIÓN DEL CLIMA ESCOLAR: CONSTRUCCIÓN Y VALIDACIÓN DE INSTRUMENTOS DE MEDIDA

Resumen

El objetivo de este estudio consiste en la presentación del proceso de construcción, prueba y validación de instrumentos de medida para medir el clima escolar, en la perspectiva de alumnos a partir del 7º año de la enseñanza fundamental, sus profesores y gestores. Se realizó una revisión de la literatura nacional e internacional sobre la temática, se constituyó el concepto, la matriz de referencia compuesta de ocho dimensiones interrelacionadas y los instrumentos de medida. Con base en una muestra de 11.516 respondedores, se procedió a los análisis estadísticos y cualitativos concernientes al proceso de validación: evidencias de validez de contenido y de constructo. Las dimensiones y sus respectivos ítems indicaron buena carga componencial y buenos índices de fiabilidad, para validar los instrumentos de medida.

AMBIENTE ESCOLAR • INSTRUMENTO DE MEDIDA • VALIDEZ

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ÉVALUATION DU CLIMAT SCOLAIRE: CONSTRUCTION ET VALIDATION D'INSTRUMENTS DE MESURE

Résumé

L'objectif de cette étude est de présenter le processus de construction, de testage et de validation d'instruments pour mesurer le climat scolaire, dans la perspective non seulement des élèves à partir de la septième année de l'enseignement fondamental au Brésil, mais aussi de leurs professeurs et des administrateurs. Une revue de la littérature nationale et internationale sur le sujet a été réalisée, suivie de l´élaboration du concept, de la matrice de référence, composée de huit dimensions interdépendantes et des instruments de mesure. A partir d'un échantillon de 11.516 répondants, ont été realisées des analyses statistiques et qualitatives concernant le processus de validation: tests de validité du contenu et du principe. Les dimensions et leurs éléments respectifs ont indiqué un grand nombre de composantes et de bons indices de fiabilité, afin de valider les instruments de mesure.

ENVIRONNEMENT SCOLAIRE • INSTRUMENT DE MESURE • VALIDITÉ

AVALIAÇÃO DO CLIMA ESCOLAR: CONSTRUÇÃO E VALIDAÇÃO DE INSTRUMENTOS DE MEDIDA

Resumo

O objetivo deste estudo consiste na apresentação do processo de construção, testagem e validação de instrumentos de medida para mensurar o clima escolar, na perspectiva de alunos a partir do 7º ano do ensino fundamental, seus professores e gestores. Realizou-se uma revisão da literatura nacional e internacional sobre a temática, constituiu-se o conceito, a matriz de referência composta de oito dimensões inter-relacionadas e os instrumentos de medida. Com base numa amostra de 11.516 respondentes, procedeu-se às análises estatísticas e qualitativas concernentes ao processo de validação: evidências de validade de conteúdo e de constructo. As dimensões e seus respectivos itens indicaram boa carga componencial e bons índices de fidedignidade, de modo a validar os instrumentos de medida.

AMBIENTE ESCOLAR • INSTRUMENTO DE MEDIDA • VALIDADE

ALTHOUGH IT IS DIFFICULT TO CONCEPTUALIZE IT, GIVEN THE SCHOOL WORLD'S complexity and specific features, quality education consists in enabling an integral education, which contains in its conception the physical, cognitive, affective and socio-moral aspects so as to contribute to educate honest, fair and respectful citizens, while also including the necessary learning and knowledge for a productive, satisfactory life in a democratic society.

Therefore, it is important for the school to continuously seek to promote a positive school climate. The climate is related to the life quality life in the educational institution and reflects the perception of students, teachers, managers, other employees and family on the school's everyday work, shared values, established and agreed rules, proposed goals, teaching and learning development, interpersonal relationships and organizational structures (COHEN, 2006, 2010, 2012). Every school has its own climate, which is perceived by those who are part of it. Numerous studies indicate an association between the climate quality and school actors' well-being, specifically with regard to students, by showing a relationship between academic performance, motivation to learn, behaviors, sense of belonging and justice, satisfaction with the school, knowledge appreciation and self-concept (FAN; WILLIAMS; CORKIN, 2011; CUNHA; COSTA, 2009; GOMES, 2005; GAZIEL, 1987; LOUKAS, 2007; COHEN; PICKERAL; MCCLOSKEY, 2008; COHEN, 2010).

Schools with a positive climate have good interpersonal relationships, an environment of care and trust, quality in the teaching and learning process, spaces for participation and the dialogic conflict resolution, closeness to parents and the community, good communication, a sense of justice (rules are necessary and obeyed, and sanctions are fair), a stimulating and supportive, student-centered environment in which individuals feel safe, supported, engaged, belonging in the school and respectfully challenged (FREIBERG, 1998, 2005; BRUNET, 2001; COHEN, 2009; DEBARBIEUX *et al.*, 2012; SHERBLOM; MARSHALL; SHERBLOM, 2006; VINHA; MORAIS; MORO, 2017).

Since we recognize the relevance of the climate in an educational institution, we argue that understanding and analyzing the school climate may reveal essential elements for identifying positive aspects of school dynamics, as well as aspects deserving further investigation and interventions in order to improve the quality of this environment. Therefore, in this article we present the results of a study[1] that aimed to design, apply and analyze the instruments' validation evidence. adapted to Brazilian schools, in order to evaluate the school climate according to students from the 7th grade of primary education onwards, as well as teachers and managers.

SCHOOL CLIMATE

The school climate concept is complex and varies widely. After decades of studies, there is no consensus among researchers from the various countries that study the subject. In the literature, one finds terms such as a school's ethos, atmosphere, ideology, community, personality, health or social environment. The studies range from analyzes on how individuals feel in the institution to how they perceive the institutional, organizational and coexistence spaces, to how the relationships occur between the school actors and the educational experiences (GANGI, 2010; JANOSZ; GEORGES; PARENT, 1998; THIÉBAUD, 2005; HOY; HANNUM, 1997).

According to Brunet (1992), the literature delimits three broad and distinct school climate definitions: one based on the institution's characteristics (its organizational attributes); another, in which the climate is defined according to the satisfaction of each individual's needs, based on their emotions (a perceptive measure of individual attributes); and a third one, which is a perceptive measure of organizational characteristics, how it acts in relation to its members and the surrounding society.

In Gaziel's (1987) view, the school climate consists of the individual's set of perceptions and feelings about his or her organization's functioning. The climate can influence the behavior of the people coexisting in that space and, in

1 "Pursuing ways that promote respectful coexistence in the classroom every day: investigating the school climate". That study was conducted by the team of researchers at the Research Group on Moral Education (Gepem) – Unicamp/ Unesp – and by researchers at different universities in Brazil who formed a team. Funded by: the São Paulo Research Foundation (Fapesp) and the Lemann Foundation.

turn, it may affect interpersonal relationships, the way individuals relate to one another, thereby characterizing the environment within the school.

For Elsabé (2006), social space is also conceived as a fundamental point of the school. According to the author, people's perceptions of the various aspects of the internal environment are the elements that form the climate (safety, high expectations, relationships with teachers, students, parents, managers and other school employees), as well as aspects affecting behaviors (how individuals relate to one another). It refers, therefore, to the school's heart and soul, with respect to the psychological, institutional, and organizational attributes that result in the institution's personality. In this way, it defines school climate as the social space in which individuals interact with each other in the educational environment.

After an extensive bibliographical review on school climate and its diagnosis, we could not identify consensus about the concept regarding the subject. However, the references researched have in common the idea of climate as the perception that school actors have about the environment and the relationships established there. Such perceptions are collective and can significantly influence groups' behavior, thus suggesting their association with the teaching and learning process quality, as well as the interpersonal relationships in the school.

Based on the literature of the area and on research that we have developed with school climate, we understand school climate as the set of perceptions and expectations shared by the members of the school community resulting from their experiences in that context, regarding the following interrelated factors: norms, objectives, values, human relationships, organization and the physical, pedagogical and administrative structures that are present in the educational institution (VINHA; MORAES; MORO, 2017). The climate corresponds to the perceptions of teachers, students, management team, employees and families, according to a real common context, therefore, it consists of subjective assessments. It refers to the psychosocial a school's atmosphere, and each school has its own climate. It influences the school dynamics and, in turn, is influenced by it; the climate therefore interferes in the life quality and in the quality of the teaching and learning process.

Thiébaud (2005) presents a review according to which students are sensitive to the school climate, and this may influence their behavior and adaptation. The author considers that the school climate is associated with an institution's general effectiveness degree, but especially with the level of incivility, violence and stress experienced. This is also what Blaya *et al.* (2004) show in their study, where they relate school climate with victimization among students. The authors conclude that the school climate is a key element of a school's proper functioning; when it is negative, it may represent a risk factor for the school's life quality, thus contributing to feelings of unease, behavioral problems and the emergence of violence.

In this respect, the studies of Debarbieux *et al.* (2012) emphasize that school climate quality is a key variable to prevent violence. According to the author, the institutions that succeeded in their violence prevention programs had a positive

school climate. Therefore, school climate quality contributes significantly to the success or failure of intervention programs's implementation.

The relationship between a positive school climate and higher achievement is found in several studies (MELO, 2017; CASASSUS, 2008; WARNER; HEINDEL, 2017; REYNOLDS *et al.*, 2017). Casassus (2008) points out that among the different outcomes of a study involving 14 countries, a positive classroom climate – which translates into a learning-conducive environment – was the most surprising factor. According to the author, in the schools where students enjoyed a positive emotional climate, "their achievements were up to 36% higher than the average grade in the Language test and 46% higher in Mathematics" (CASASSUS, 2008, p. 1).

Other studies are in line with these findings, indicating that a high sense of belonging in a school, generated by a positive climate, is associated with better academic achievement. Students who feel they belong learn more, have greater responsibilities, participate more, and are more motivated because they feel appreciated, and perceive that their teachers are strongly connected to the school community (FREIBERG, 2005; DAAR, 2010).

Thapa *et al.* (2013) conducted a careful review of the international literature on school climate since the 1970's. According to the authors, a positive school climate has a strong influence on students' motivation to learn, mitigates the negative impact of the socioeconomic context on academic success, acts as a protective factor for learning and developing a positive life in young people, contributes to students' emotional and social development and student and teacher well-being, is directly related to good academic achievement at different education levels and can collaborate not only to students' immediate success, but its effect also seems to persist for years.

Besides the concept, another difficulty identified in the literature review was the multiple dimensions that form the school climate. At times, we identify research focusing on dimensions of a more objective nature and others on more subjective ones. Freiberg (1998) considers that the school climate is the result of the articulation of multiple dimensions comprising the institution's structural, environmental, organizational, linguistic, social and emotional elements. Other studies (ELSABÉ, 2006; COHEN *et al.*, 2009; COHEN, 2012; GAULEY, 2017; LANE, 2017; ALSTON, 2017) present the relationship between diverse dimensions that make up the climate: the nature of the work with knowledge, the relationship with school members, the school building's architecture and its physical space, the organizational structure, conflicts and security, the quality of rules and participation, the management style, motivations and academic achievement, among others.

There are multiple ways to evaluate the school climate – observations, interviews, focus groups, questionnaires, etc. –, but it is imperative that such evaluations be based on methodological rigor, duly validated both theoretically and statistically. Besides the distinction in the ways of evaluating, there are differences in the groups evaluated (sometimes only students and/or teachers). Few studies comprise the various actors in the institution (teachers, managers,

students, employees, family), thus covering multiple dimensions in diagnosing the climate. This evaluation will allow knowing and coordinating the multiple perspectives of the different school community members (students, teachers, managers, parents, etc.) to provide insight on what is going well and what can be improved in the school, thus contributing to planning interventions based on identified needs and potentialities.

There are numerous actions that can be developed to promote the "well-being" of all through efforts to improve school climate quality. This can be done by means of: a management style that is open to change; the implementation of systemic strategies that promote the support of all in the school; a continuous attention to teaching processes' improvement; ensuring a welcoming, safe and fair school; constantly exercising dialogue and collective work; good communication and transparency; encouraging students and the community to participate in the institution's decision making (creating democratic communities), so as to allow the development of sociability and belonging (COHEN, 2006; 2010; FREIBERG, 1998; 2005; THAPA, 2012; THAPA *et al.*, 2013; VINHA; MORAIS; MORO, 2017).

Through our survey of national and international studies and research, we could not find validated school climate evaluation instruments focusing on the Brazilian context and covering the perspectives of the various school community members. With this purpose, this article presents the steps taken to design and validate measurement instruments to evaluate the school climate in Brazilian schools. These steps involved the conceptual elaboration of the phenomenon, the dimensions to be investigated, and the processes to design and validate three measurement instruments to evaluate the climate from the perspective of public and private school students, teachers and managers of the final years primary education and secondary education. This study aimed to offer reliable tools for researchers and for schools in order to allow them to independently assess the climate so that, by listening to school members' different demands, they can identify those aspects that need to be changed for the sake of a collective project focused on quality and integral education.

METHOD

In order to achieve the objectives above, we planned and developed the work in different phases. For each phase, we emphasize an analysis methodology, and the results achieved in each of them were the object of reflections, evaluations and planning for the subsequent steps. Thus, we present here a summary of this process and the respective methodological procedures employed.

In order to collect data,[2] authorization from the institutions was asked and a written informed consent form (TCLE) was presented to each group's

2 The present study was submitted to the Research Ethics Committee at the Faculty of Medical Sciences of Unicamp, and received favorable opinion for its execution (CAAE: 32973114.2.0000.5404).

participants (students and their parents, teachers and managers) to formally clarify to them about the subject of the research and its objectives.

STUDY PHASES

The phases below represent the organization of the course of studies and actions related to the measurement instruments' design and validation. They cover from the conceptualization of the school climate construct to the elaboration of the reference framework, to the design of the items and the respective questionnaires, both in print and online for students, teachers and managers, to the statistical and theoretical analyzes of the data collected in the two empirical tests, to the verification of content and construct validity evidence from the theoretical and psychometric analyzes.

THE FIRST PHASE: DEFINING THE CONCEPT OF SCHOOL CLIMATE AND BUILDING THE MEASUREMENT INSTRUMENTS

Based on a broad review of the national and international literature on school climate, we constructed the concept of this construct and, together with the Research Group on Moral Education (Gepem), we elaborated the reference framework (formed by interrelated dimensions) to create the first evaluative items that made up the measurement instruments.

The databases consulted were: University of São Paulo's Integrated System of Libraries (SIBiUSP); *Scientific Electronic Library Online* (SciELO); the Portal of Journals of the Ministry of Educaton's Coordination for the Improvement of Higher Education Personnel (Capes/MEC); *Sage Journals*; the Brazilian Portal of Open Access to Scientific Information (Oasisbr); and *Open Access Theses and Dissertations* (OATD). Our search considered studies in Portuguese, Spanish, English and French. After analyzing the identified materials, we selected 78 texts, among which are: articles, theses, dissertations, books and technical reports on school climate, as well as various school climate measurement instruments indicated by researchers. We also searched for articles that appeared in the references, when related to educational evaluation.

As said earlier, after a detailed analysis of the selected material, we found different and complementary school climate concepts, and developed our study to arrive in the climate concept definition mentioned in the previous item. Like the concept, we also designed the reference matrix, which consisted of the climate construct's dimensions and originated the evaluative items (Table 1).

TABLE 1
SCHOOL CLIMATE REFERENCE FRAMEWORK

SCHOOL CLIMATE – FRAMEWORK		
DIMENSION	**CONCEPT**	**GROUP**
1. Relationships with teaching and learning	In this dimension, good quality lies on the perception of the school as an effective place of work with knowledge, which seeks students' success, motivation, participation and well-being, promotes schooling and the meaning of learning. It also implies the effective work of a stable teaching staff and differentiated strategies that promote the learning of all, as well as continuous assistance so that no student is left behind.	Student Teacher Manager
2. Social relationships and conflicts in the school	This refers to relationships, conflicts and perceptions about the quality of treatment among school members. It also covers the identification by adults of intimidation and mistreatment situations experienced in peer relations, and the school professionals' co-responsibility in coexistence problems. The good quality of the relational climate is the result of positive relationships in this space, opportunities for effective participation, the guarantee of well-being, respect and support between people, thus continuously promoting a sense of belonging.	Student Teacher Manager
3. Rules, sanctions and safety in school	This dimension concerns the perceptions of managers, teachers and students regarding interventions in interpersonal conflicts in school. It covers the creation, the content, the legitimacy and the fair application of rules and sanctions, also identifying the types of punishment generally employed. It also includes order, justice, tranquility, coherence and security in the school environment.	Student Teacher Manager
4. Situations of intimidation among students	This dimension deals with the identification of situations of intimidation and mistreatment in the relationships between peers and of bullying perceived by students, as well as the places where they occur.	Student
5. Family, school and community	This refers to the perception of the quality of relationships between school, family and community, including respect, trust and support among these groups. It covers how the school acts, considering the community's needs. It involves the feeling of being an integral part of a group that shares common goals.	Student Teacher Manager
6. Infrastructure and physical environment of the school	This is the perception of the quality of the school's infrastructure and the physical space, as well as its use, suitability and maintenance. It refers to how equipment, furniture, books and materials are prepared and organized to receive students and provide them with free access, security, coexistence and well-being in these spaces.	Student Teacher Manager
7. Relationships with work	These are the feelings of managers and teachers regarding their work environment and the educational institutions. It covers perceptions regarding professional training and qualification, study practices and reflections on actions, recognition of, satisfaction with and motivation for the role they play, and the support they receive from managers and other professionals.	Teacher Manager
8. Management and participation	This covers the perception about the quality of the processes used to identify the school's needs, the interventions and results evaluation. It also includes the organization and articulation between the various groups and actors that form the school community in order to promote spaces for participation and cooperation to achieve common goals.	Teacher Manager

Source: Vinha, Moraes and Moro (2017).

The questionnaires consisted of four-point Likert items directed to students from the 7th grade of primary education onwards, as well as their teachers and managers. We chose students of the final grades of primary school onwards because these instruments' construction was part of a larger intervention project to improve life quality in public schools that covered grades 6-9 of primary education (VINHA *et al.*, 2016).

Grade 6 was not included because it is a period of great changes for these students, often involving changing schools, an increase in the number of teachers and subjects, the type of assessment, among others. We decided to administer the questionnaire to students from grade 7 onwards because they are already more adapted to this education level's organization and operation, as well as because of the questionnaire's complexity and size.

After the making the first version of the instruments, we submitted it to specialists in the area of interpersonal relationships in the school, who did not know the items and improved them after such analysis. We then proceeded to pre-testing with a sample of 80 students from grades 6 to 9 in two schools – a public and a private one – , with 20 students in each grade: 10 boys and 10 girls; 92 teachers, 39 of which at two public institutions and 53 at three private schools; and 16 managers (principals, vice-principals, coordinators, advisors), seven of which at public institutions and nine at private ones. This non-probabilistic sample, in which the state (São Paulo) was chosen by convenience – schools and respondents were chosen by convenience and voluntary adhesion –, allowed checking the instruments with regard to vocabulary suitability, the item's contents and their alternatives, respondent comprehension, and estimated time for completion. Based on this procedure, each instrument had the following structure:

- 178 items, plus 22 profile questions for students;
- 227 items, plus 8 profile questions for teachers;
- 252 items, plus 8 profile questions for managers.

It is worth mentioning that in the set of items we designed are *specific items* for each group (students, teachers and managers) and also the *relation items*, which concern the statements proposed for the three questionnaires, which aim to find the different perspectives of participants about the same topic. In other words, they have the same meaning for the different groups evaluated.

THE SECOND PHASE: DATA COLLECTION, ANALYSIS, RETURN TO SCHOOLS AND VALIDITY EVIDENCE

In the first empirical test, we used a non-probabilistic sample in which the state of São Paulo was chosen by convenience and the schools and the participants were chosen by convenience and voluntary adherence, in order to include all subjects in the participant schools that met the criterion of being enrolled in grades 7, 8 and 9 of primary education. Thus, we administered the questionnaires to students in grades 7 to 9, as well as teachers and managers at four municipal schools in the city of Campinas, totaling 663 participants.

The first data analyzes were quantitatively implemented using the SAS System for Windows (Statistical Analysis System), version 9.2. SAS Institute Inc., 2002-2008, Cary, NC, USA and IBM © SPSS © Statistics 22.0. Through this processing, we structured reports with general descriptive analyzes of responses' frequency for the categorical variables (school climate and profile items).

Through the calculation of the average score obtained in each dimension, we proposed the coding of the scores for categorical data, i.e., negative, intermediate and positive levels were assigned to the four-point alternatives. To that end, we divided the four points of the Likert scale into tertiles. The first tertile was assigned a score of 1 to 2.25: negative level; to the second tertile, 2.26 to 2.75: intermediate level; and, to the third tertile, 2.76 to 4.00: positive level. We thus obtained the frequencies of positive, intermediate and negative evaluation for each climate dimension in order to get the first diagnoses of the school actors' perceptions about their school.

We expanded the respondent sample using the same sample procedures referred above, so that we could have enough data for statistical processing. We reached a total of 1,142 respondents for the new database, 797 of which were students, 243 were teachers and 102 were managers at municipal and private schools.

We coded the new instruments, organized the data in Excel and SPSS spreadsheets and restarted the statistical processes:

- Semantic analysis of items;
- Item reliability analysis (Cronbach's alpha);
- Judge analysis – content validity;
- Confirmatory factor analysis (CFA) – Construct validity.

Semantic Analysis

The semantic analysis consisted in reading in detail each evaluative item and comparing them with the results of the response frequency statistical processing. Through this analysis, we identified the items that presented problems with the statement, the alternatives and the express meaning for the respondents. In addition, we examined the school climate diagnosis results by comparing it to data from sessions of observation of the schools participating in the empirical testing. This analysis allowed us to check the "criterion", i.e., by comparing the climate outcomes with what we experienced at the schools, we verified the instruments' ability to measure what they were meant to as a diagnosis of school actors' perceptions. We then returned the results to the schools, presenting and discussing the climate diagnosis with teachers and managers and, by considering the researchers' observations that preceded the measurement instruments, we noticed that the perceptions captured by the climate questionnaires were consistent with what the school members experienced or demonstrated to know about the factors related to their school. We therefore verified that the measurement instruments were pertinent and able to measure what they had been proposed to.

Based on the re-reading and analysis of each item, we made language adjustments in the statements and in the alternatives of some of them. Thus we arrived at the second measurement instruments structure for the statistical analysis process, which comprised 103 items for students, 125 for teachers and

133 for managers. These were the items submitted to statistic processing, since the excluded items were not.

Statistical Analyzes of the First Empirical Testing

We performed the internal consistency analyzes of the instruments for the three participant groups (students, teachers and managers) using the Cronbach's Alpha coefficient. Through the processing performed in the sample, we found that most of the dimensions reached satisfactory coefficients of internal consistency. Then, we processed the factorial structure of the school climate questionnaire's dimensions – Factorial Confirmatory Analysis (FCA). The main goal of this procedure was to analyze the dimensions' theoretical factorial structure , initially for two groups (students and teachers). The reason why we decided not to include the group of managers at that point was the small number of participants for processing. Thus, we were able to examine whether the theoretical model proposed in the instrument design process was confirmed via structural equation modeling for latent variables.

Statistics were calculated to test the goodness of fit and to determine whether the factors explained the correlations observed between the variables, according to the proposed theoretical model. However, although these analyzes have been carried out, the present paper will present the statistical results of the second empirical test.

Based on the statistical results, we conducted again the semantic analysis of each item and their respective dimensions. Considering the evaluative items' relevance to the construct of the school climate, as well as its importance for the diagnosis of Brazilian school context, we chose not to exclude all items indicated in the factorial processing. We submitted again all items to the appreciation of pairs of specialists in the area of school interpersonal relations in order to constitute content evidence with the selected judges. Based on the entire analysis procedure, we had the following instrument structure:

- 108 items plus 15 profile items for students;
- 129 items plus 8 profile items for teachers;
- 133 items plus 8 profile items for managers.

THE THIRD PHASE: SAMPLE, DESIGNING OF ONLINE INSTRUMENTS, DATA COLLECTION AND ANALYSIS

Building the sample of students, teachers and managers

For this new questionnaire administration, we developed online versions of the instruments in SurveyMonkey, and respondents included students, teachers and managers from the 7th grade of primary education to the 3rd year of high school, at both public and private schools in Brazil.

In forming the sample for the second empirical test, the states were selected by convenience, according to the contacts and partnerships established with the researchers of the team; in eight states (CE, MS, PE, PR, SP, RN, SC and MG) the sampling was non-probabilistic, i.e., the selection of schools and individuals occurred by convenience and voluntary adhesion, and it aimed to cover all the individuals at the participant schools that met the criterion of being enrolled in the 7th, 8th or 9th grade of primary education or the 1st, 2nd or 3rd year of high school. In one state (ES), due to a partnership established with the Unibanco Institute, sampling was probabilistic, i.e., stratification and randomization techniques were used to select schools and individuals.

It is necessary to note that our goal was, initially, to validate the instruments for students in primary education's final year, as well as teachers and managers in that segment. However, we decided to analyze with the group of researchers the interest and benefits of including in the instrument validation process high school students, teachers and managers, since the questionnaires also included in their design features of this education level. Thus, we decided to administer and validate the instruments for students, teachers and managers from the 7th year of primary education to the 3rd year of secondary education of public and private schools in Brazil.

We reached a sample of 11,516 respondents corresponding to 9,112 students, 1,533 teachers and 871 managers, distributed as shown in Tables 1, 2 and 3.

TABLE 1
STUDENT SAMPLE ACCORDING TO SCHOOL TYPE AND STATE

STUDENTS				
SCHOOL TYPE	STATES			
	CE	MS	SP	ES
Public	92	381	3.850	2.850
Private		114	1.825	
Subtotal	92	495	5.675	2.850
TOTAL	**9.112 students**			

Source: Prepared by the authors.

TABLE 2
TEACHER SAMPLE ACCORDING TO SCHOOL TYPE AND STATE

TEACHERS				
SCHOOL TYPE	STATES			
	CE	MS	SP	ES
Public	82	16	827	439
Private		4	165	
Subtotal	82	20	992	439
TOTAL	**1.533 teachers**			

Source: Prepared by the authors.

TABLE 3
MANAGER SAMPLE ACCORDING TO SCHOOL TYPE AND STATE

MANAGERS									
SCHOOL TYPE	STATES								
	CE	MS	PE	PR	SP	ES	RN	SC	MG
Public	15	4	8	6	427	176	3	2	4
Private		2	1	1	217		2	2	1
Subtotal	15	6	9	7	644	176	5	4	5
TOTAL	871 managers								

Source: Prepared by the authors.

Data Analysis Procedures

Given the school climate construct's complexity and constituent dimensions, two hypotheses were tested, namely: the reflective model and the formative model.

For the reflective model (the school climate causes the different perceptions for the dimensions that form it), the processing and analysis model used Factor Analysis, and we evaluated the following indexes' suitability:

- Chi-square/degrees of freedom ratio (c^2/DF);
- Comparative Fit Index (CFI);
- Tucker-Lewis Index (TLI);
- Root mean-square error of approximation (RMSEA).

However, assuming as a theoretical perspective the hypothesis that the school climate is based on the formative model (the school actors' different and shared perceptions on the dimensions assessed generate the school climate), the processing and analysis model used Principal Component Analysis (PCA).

PCA was used to investigate the extent to which the items generate different climate dimensions and, therefore, the common and specific variances for each item will be considered.

Finally, in order to measure the accuracy of the school climate measurement instruments' internal structure, we conducted the composite reliability (CR) analysis of the components so as to consider the relative importance (componential load) of each item (HAIR *et al.*, 2009; FORNELL; LARCKER, 1981).

RESULTS

According to the Reflective Model, the observed behaviors are reflections of a latent feature, so that the psychological construct or latent variable affects people's perception about the assessed dimensions (HAIR *et al.*, 2009). Thus, according to this model, the school climate may be said to promote or cause school actors' perceptions (negative or positive) about the school's features. So, assuming the school climate as a reflexive construct, the hypothesis is that all indicator items are caused by the same latent variable and that the evaluative items must therefore be highly correlated with each other (HAIR *et al.*, 2009).

Therefore, to test this hypothesis, we performed Factor Analyzes. Our initial goal was to assess the fit of the theoretical dimension proposed for each school climate questionnaire: for students, it had six dimensions, while for teachers and managers, it comprised eight dimensions.

We investigated the three measurement instruments using Exploratory and Confirmatory Factor Analyzes, the goodness of fit of each dimension separately, in order to assess the plausibility of its theoretically postulated unifactorial structure.

When the exploratory models tested by Factor Analysis did not show a good fit, the modification indexes (MI) were inspected for structural problems in the factor. Based on this procedure's results, adjustments were made in order to make the scale acceptable from the scientific and psychometric viewpoint; to that end, the exclusion of evaluative items was indicated. Even though choosing some items for exclusion, we repeated their semantic analysis in order to qualitatively examine their relevance to the school climate diagnosis in their respective dimensions.

From this perspective, we emphasize once more the importance of the dimensions' design and the theoretically based set of items for evaluating the climate. Some important items for this diagnosis needed to be kept in the school climate construct, even if they did not show a strong relationship with the other items of that dimension in which they were placed according to the processing result. This is due to the fact that each item also has an individual contribution (specific variance), which, although not taken into account in the factor analysis processing, cannot be neglected for climate diagnosis. An example of an item with such characteristics would be "*teachers in this school are often absent*". This item refers to the teaching and learning dimension. When processed in the factor analysis, only the elements related to learning (common variance) will be considered, whereas in the item's specific variance, which brings elements concerning the teacher's attitude in relation to the school, it is not taken into account. Because we believe the information in the item is relevant for climate assessment, we chose to keep it in the instruments.

That being said, we decided to evaluate another structural processing and consider the formative theoretical model. The formative perspective considers the hypothesis that the school climate emerges in relation to school actors' perceptions about the school's different dimensions, i.e., the way in which the respondents perceive and experience the school's features as portrayed in the evaluated dimensions will generate the school's climate. In this model, the climate does not correspond to a psychological variable, but to an external construct built by the perceptions shared by those who experience the school environment together.

In other words, while reflective items are caused by the construct (the school community's perceptions about the school are provoked by the school climate), the formative items are responsible for generating the factor (the school climate emerges from school actors' shared perceptions).

We believe that both theoretical perspectives provide relevant approaches in order to show that, as far as PCA is concerned, the school climate remains a latent feature, but it is a consequence, not a predictor. On the other hand, the school climate is dialectical, i.e., perceptions generate the climate, which, in turn, feeds perceptions so as to reproduce them and/or generate new perceptions.

Unlike Factor Analysis, which considers only the common variance of data, PCA considers the variables according to their total variance, i.e., data are grouped according to their common, specific and error variance according to their behavior within the dimension (BROWN, 2006; FIELD, 2009).

Our methodological option for PCA was to examine dimensions individually, observing the variances existing in each item within each dimension. Thus, we could keep the largest number of significant items for diagnosing the climate. Otherwise, if we chose to analyze grouped dimensions for technical reasons, based only on the pattern of participants' responses, we could group items that may also be represented in different dimensions.

Thus, we performed two fundamental statistical tests for PCA processing, namely: Kaiser-Meyer-Olkin (KMO) Criterion and Bartlett's Sphericity Test. According to Tabachnick and Fidell (2007), KMO indices are considered to be good from 0.70 onwards. With regard to Bartlett's Sphericity Test, test values with significance levels $p < 0.05$ indicate that the matrix is factorable and we can carry out the analyzes.

After verifying that factoration was possible, we examined the componential retentions (the suitable number of components to be retained), called Factor/Component Retention Methods. The methodology used to find the number of components to be retained was the Hull method, using Factor software (LORENZO-SEVA; FERRANDO, 2006; LORENZO-SEVA; TIMMERMAN; KIERS, 2011; CEULEMANS; TIMMERMAN; KIERS, 2010).

Thus, we retained the items that presented componential load ≥ 0.30. Items with loads below 0.30 were indicated for exclusion because they had a low covariance with the other items of the scale.

Finally, as said earlier, we used Composite Reliability (CR) as a reliability measure. We emphasize that the internal structure's accuracy assessed through composite reliability is also validity evidence.

Table 4 summarizes the results obtained in the processes above.

TABLE 4
SUMMARY OF THE RESULTS OF PRINCIPAL COMPONENT ANALYSIS AND COMPOSITE RELIABILITY

DIMENSIONS	PROCESSES	QUESTIONNAIRE: STUDENTS	QUESTIONNAIRE: TEACHERS	QUESTIONNAIRE: MANAGERS
1 - Relationships with teaching and learning	KMO Test	0.85	0.90	0.91
	Bartlett's Sphericity	$p < 0.01$	$p < 0.01$	$p < 0.01$
	Componential Loads – PCA	> 0.30 (18 items) < 0.30 (2 items)	> 0.30 (28 items) < 0.30 (2 items)	> 0.30 (20 items) < 0.30 (1 item)
	Composite Reliability (CR)	0.90	0.96	0.82
2 - Social relationships and conflicts in the school	KMO Test	0.87	0.91	0.91
	Bartlett's Sphericity	$p < 0.01$	$p < 0.01$	$p < 0.01$
	Componential Loads – PCA	> 0.30 (22 items) < 0.30 (2 items)	> 0.30 (20 items) < 0.30 (1 item)	> 0.30 (21 items) < 0.30 (2 items)
	Composite Reliability (CR)	0.96	0.91	0.92
3 - Rules, sanctions and safety in school	KMO Test	0.89	0.85	0.85
	Bartlett's Sphericity	$p < 0.01$	$p < 0.01$	$p < 0.01$
	Componential Loads – PCA	> 0.30 (32 items) < 0.30 (0 items)	> 0.30 (21 items) < 0.30 (9 items)	> 0.30 (26 items) < 0.30 (3 items)
	Composite Reliability (CR)	0.95	0.98	0.86
4 - Situations of intimidation among students	KMO Test	0.89	Items were included into Dimension 2 with load > 0.30	Items were included into Dimension 2 with load > 0.30
	Bartlett's Sphericity	p < 0.01		
	Componential Loads – PCA	> 0.30 (15 items) < 0.30 (2 items)		
	Composite Reliability (CR)	0.92		
5 - Family, school and community	KMO Test	0.75	0.89	0.86
	Bartlett's Sphericity	p < 0.01	p < 0.01	p < 0.01
	Componential Loads – PCA	> 0.30 (7 items) < 0.30 (0 items)	> 0.30 (11 items) < 0.30 (0 items)	> 0.30 (12 items) < 0.30 (1 item)
	Composite Reliability (CR)	0.88	0.95	0.87
6 - Infrastructure and physical environment of the school	KMO Test	0.88	0.88	0.87
	Bartlett's Sphericity	$p < 0.01$	$p < 0.01$	$p < 0.01$
	Componential Loads – PCA	> 0.30 (8 items) < 0.30 (0 items)	> 0.30 (8 items) < 0.30 (0 items)	> 0.30 (8 items) < 0.30 (0 items)
	Composite Reliability (CR)	0.89	0.97	0.88
7 - Relationships with work	KMO Test	Exclusive for teachers and managers	0.91	0.90
	Bartlett's Sphericity		$p < 0.01$	$p < 0.01$
	Componential Loads – PCA		> 0.30 (12 items) < 0.30 (0 items)	> 0.33 (12 items) < 0.30 (1 item)
	Composite Reliability (CR)		0.92	0.83
8 - Management and participation	KMO Test	Exclusive for teachers and managers	0.93	0.93
	Bartlett's Sphericity		$p < 0.01$	$p < 0.01$
	Componential Loads – PCA		> 0.30 (13 items) < 0.30 (0 items)	> 0.30 (26 items) < 0.30 (1 item)
	Composite Reliability (CR)		0.93	0.94

Source: Prepared by the authors.

We can see in Table 4 that in all dimensions of the three instruments, the indices obtained in the KMO test were above 0.7 and are therefore considered good indices for PCA processing. The values in the Bartlett sphericity test presented a level of significance (p <0.01), showing that the data matrix can be factored. The instrument items' componential loads in the different components reached a value greater than 0.30 in most items, which allowed keeping most items and resulted in indicating few items for exclusion. Therefore, we conducted yet another semantic assessment of the items indicated for exclusion. Thus, we eliminated four items for students, six for teachers and three for managers. The other items with insufficient componential loads were kept in the instruments due to their relevance to the school climate construct.

With regard to Composite Reliability (CR), in all dimensions of the three instruments, values greater than 0.77 were reached, most of which above 0.85. According to Hair *et al.* (2009), the recommendation for acceptable CR cutoff point values is above 0.50, and the closer to 1 (100%), the greater the reliability of the scale. Valentini and Damásio (2016) say that CR is a robust indicator to present score accuracy evidence, which is validity evidence for the construct. Thus, based on the values obtained, we can affirm the accuracy of the instruments' internal structure.

Considering all the processing and rigorous analysis of PCA and CR outcomes, the following steps were performed to change the instruments and the reference framework: exclusion of items with a componential load smaller than 0.30; modification of the contents of a few items that still showed problems of meaning and/or writing; in the instruments for teachers and managers, the items in Dimension 4 – Intimidation were transferred to Dimension 2 – Social Relationships; and small adjustments were made in the reference framework. We therefore arrived at the final composition of our measurement instruments to evaluate the school climate in Brazilian schools, which comprise 104 items for students, 123 items for teachers and 130 items for managers.

Considering the whole process reported above and based on the results obtained, we ratify the evidence for the construct and content validity, thus verifying that the measurement instruments to evaluate the school climate from the perspective of students, teachers and managers in Brazilian schools are properly validated both in theoretical and psychometrical terms. The measurement instruments are freely available to schools and other researchers interested in implementing investigations in this area, and they can be accessed via the Manual for administration of questionnaires to evaluate the school climate, which is available at the digital library of the Unicamp Faculty of Education.[3]

3 Available at: http://www.bibliotecadigital.unicamp.br/document/?code=79559&opt=1.

FINAL CONSIDERATIONS

Although widely considered in other countries, especially in the United States, school climate investigation is still scarcely studied in Brazil. A climate assessment allows each individual to express their perceptions and feelings about, and their experiences at their school. The set of perceptions of all individuals in the school provides a picture of the socio-educational environment, thus allowing to recognize what is happening (both strengths and weaknesses) in order to establish priorities and areas to which improvement efforts and interventions should be directed. As stressed earlier, the school is a complex universe formed by different, interrelated dimensions, so the possibility to investigate them in their specific features is what will induce the movement of climate change and reform.

Diagnosing school climate through school actors' different perceptions provides fundamental information that contributes to building the school's action plans and interventions in order to promote a better socio-educational environment. However, we emphasize the importance of partnerships between the school and universities and training institutions, as well as the assistance of specialists, so as to consider the aspects associated with the dimensions assessed, since schools often use the same repertoire to deal with problems, and it takes study and new procedures to improve what is not going well.

Another aspect that needs to be considered is that the school can perceive a particular dimension as positive, precisely because it is linked to its daily routine, therefore being unable to identify the need to review and transform such issues. For example, when assessing the dimension related to teaching and learning, the measurement instruments may capture perceptions of students and teachers that are classified as positive with respect to the pedagogical practices occurring in the classroom. However, such practices that are positively perceived by them may still be based on the idea of content transmission and reproduction, with the predominance of a traditional teaching paradigm in which classes are attached to textbooks only, without planning or designing proposals and activities that are significant, diversified and challenging. These results may be coherent, since the teachers and students at the evaluated school do not know other possibilities to work with knowledge. In some situations, the school may perceive a dimension positively because it is attached to its daily routine, and the school is still unable to identify a particular issue as problematic. It is therefore imperative that, in addition to climate assessment, other data be sought, such as external and internal assessments, including qualitative ones.

As emphasized earlier, the measurement instruments reveal the school actors' perceptions on different aspects, and it will be possible to analyze the convergent and divergent perspectives, to discuss the contradictions, and to jointly plan actions that, besides acting on the school's weaknesses and needs, may also improve the points that are felt as positive. From this perspective, the results should serve to strengthen the beginning of a reform process and, based on a work coordinated by all, identify and prioritize the areas that need

to be improved. If it is possible to share such diagnoses and procedures with researchers in the areas to be transformed, then all the better.

One major challenge of this study was not only to build three measurement instruments to assess the climate, but also conduct their psychometric validation, since each instrument assesses the perspective of each of the main actors in the school. The item sets, both exclusive and relational, which consider all school dimensions, went through the process of qualitative and quantitative analysis, when we identified validity evidence, in order to make the diagnosis reliable and valid.

We reinforce that investigating the school climate can be a valuable tool for researchers wishing to conduct research in this area, as well as for schools. In the case of schools, it allows the pedagogical team to consider the relevance of looking at the school climate to think about improvement strategies, with mechanisms and goals whether for school performance or, specially, for promoting the school as a healthier, more respectful and fairer place for all. It is in this respect that we underline the value of the instruments developed here, since they reveal the school's complex features by covering the school climate dimensions, thus providing the information that contribute to such actions.

It is worth noting that a climate assessment cannot be an end in itself, but a means to serve a project. It is necessary to consider that this evaluation must be desired. In other words, there must be an interest on the part of the school with regard to its self-assessment to recognize its features from the different eyes and perspectives that constitute it, and its members need to be informed and sensitized about the importance of the diagnosis and their participation in the decision-making involved. Although the instruments provide for evaluating the perceptions of each group, everyone should be willing to join the process in order to promote a reform towards improvement. Indeed, this should be an objective shared by students, teachers, managers, other school employees and families.

We hope that the questionnaires can contribute to a climate diagnosis in a shared way, so that we can answer a question that seems simple, but is full of meanings: what kind of school do we want ours to be?

In this question, there is an intrinsic psychological trigger, since the question statement implicitly invites us to recognize and belong in that institution. This school is OURS, and WE all, as a school community, WANT it to be better and better, so that all the specific features contained in the climate dimensions presented here can be reflected in and covered by the constant movement to improve everything that involves the institution.

It is important to emphasize that wanting the school to improve and advance is fundamental: it is the affective nature, in prominence, the driving force to act. But the cognitive nature must go hand in hand with it and, to that end, it is necessary, besides wanting, to know where, how and when to act for the movement of school improvement and reform and, therefore, it is fundamental to know the school we are in, the school we are acting on. It is necessary to know all this and to know ourselves as integrated subjects, based on the perception we

have about the various dimensions of the school universe, which is complex and rich in its peculiarities.

REFERENCES

ALSTON, C. R. *A causal comparative study of teacher and administrator perceptions of school climate within elementary schools in a school district*. 2017. 176f. Tese (Doutorado em Educação) – Liberty University, Lynchburg, VA, EUA, 2017.

BLAYA, C. *et al.* Modos de organização da vida escolar nos estabelecimentos de ensino secundário inferior na Europa. *In:* THELOT, C. (org.). *Quel impact des politiques éducatives:* les apports de la recherche, Débat National sur l'avenir del'école. Paris: Débat National sur l'avenir del'école, 2004. p. 127-154.

BROWN, T. A. *Confirmatory factor analysis for applied research*. New York: The Guilford, 2006.

BRUNET, L. Climas Escolares e eficácia da escola. *In:* NÓVOA, A. *As organizações escolares em análise*. Lisboa: Dom Quixote, 1992. p. 121-140.

BRUNET, L. *Climat organisationnel et efficacité scolaire*. Universidade de Montréal, Faculté des Sciences de l'Éducation, 2001. Disponível em: http://www.f-d.org/climat-efficacite-brunet.htm. Acesso em: 29 jan. 2013.

CASASSUS, J. O clima emocional é essencial para haver aprendizagem. *Revista Nova Escola*, v. 218, dez. 2008.

CEULEMANS, E.; TIMMERMAN, M. E.; KIERS, H. A. L. The Hull procedure for selecting among multilevel component solutions. *Chemometric and Intelligent Laboratory Systems*, v. 106, n. 1, 2010.

COHEN, J. Social, emotional, ethical, and academic education: creating a climate for learning, participation in democracy, and well-being. *Harvard Educational Review*, v. 76, n. 2, 2006.

COHEN, J. School Climate: Engaging the Whole Village, Teaching the Whole Child. *The Challenge.* A Publication of the Office of Safe and Drug-free Schools. Department of Education, United States of America, University of Colorado and Boulder, v. 16, n. 4, 2010. Disponível em: http://www.edpubs.gov/document/ed005207w.pdf?ck=97. Acesso em: 29 jul. 2015.

COHEN, J. The new standards for learning. *Principal Leadership*, Sept. 2012.

COHEN, J.; MACCABE, E.; MICHELLI, N.; PICKERAL, T. School climate: research policy, practice, and teacher education. *Teachers College Record*, v. 111, n. 1, p. 180-213, Jan. 2009.

COHEN, J.; PICKERAL, T.; McCLOSKEY, M. The challenge of assessing school climate. *Educational Leadership:* Realizing a Positive School Climate, v. 66, n. 4, Dec. 2008. Disponível em: http://www.ascd.org/publications/educational-leadership/dec08/vol66/num04/The-Challenge-of-Assessing-School-Climate.aspx. Acesso em: 1 abr. 2015.

CUNHA, M. B.; COSTA, M. O clima escolar de escolas de alto e baixo prestígio. *In*: REUNIÃO ANUAL DA ASSOCIAÇÃO NACIONAL DE PESQUISA EM EDUCAÇÃO – ANPED, 32., 2009, Caxambu, 2009. *Anais* [...]. Caxambu: Anped, 2009.

DAAR, S. E. *School climate, teacher satisfaction, and receptivity to change*. 2010. Tese (Doutorado) – Indiana State University, Indiana, 2010.

DEBARBIEUX, É.; ANTON, N.; ASTOR, R. A.; BENBENISHTY, R.; BISSON-VAIVRE, C.; COHEN, J.; GIORDAN, A.; HUGONNIER, B.; NEULAT, N.; ORTEGA RUIZ, R.; SALTET, J.; VELTCHEFF, C.; VRAND, R. Le "Climat scolaire": définition, effets et conditions d'amélioration. *Rapport au Comité scientifique de la Direction de l'enseignement scolaire*: Ministère de l'Éducation Nationale. MEN-DGESCO/Observatoire International de la Violence à l'École, 2012.

ELSABÉ, V. *Educators' perceptions of school climate in primary schools in the Southern Cape*. 2006. Submitted in fulfillment of the requirements for the degree of Master of Education. University of South Africa, 2006. Disponível em: http://uir.unisa.ac.za/bitstream/handle/10500/1647/dissertation.pdf?sequence=1. Acesso em: 10 fev. 2016.

FAN, W.; WILLIAMS, C.; CORKIN, D. D. M. A multilevel analysis of student perceptions of school climate: the effect of social and academic risk factors. *Psychology in the Schools*, v. 48, n. 6, p. 632-647, 2011.

FIELD, A. *Descobrindo a estatística usando o SPSS*. 2. ed. Porto Alegre: Artmed, 2009.

FORNELL, C.; LARCKER, D. F. Evaluating structural equations models with unobservable variables and measurement error. *Journal of Marketing*, v. 18, n. 1, p. 39-50, 1981.

FREIBERG, H. J. Measuring school climate: let me count the ways. *Educacional Leadership:* Realizing a Positive School Climate, v. 56, n. 1, p. 22-26, Sept. 1998.

FREIBERG, H. J. Three creative ways to measure school climate and next steps. *In:* FREIBERG, H. J. (org.). *School climate:* measuring, improving and sustaining healthy learning environments. New York: Taylor & Francis e-Library, 2005.

GANGI, T. A. *School climate and faculty relationships:* choosing an effective assessment measure. 2010. Tese (Doutorado) – St. John's University, School Psychology Program, New York, 2010. Disponível em: http://www.schoolclimate.org/climate/documents/GangiTracydissertation10-20-09.pdf. Acesso em: 25 maio 2014.

GAULEY, J. *Pathways to student engagement in school:* exploring the effects of school climate on school engagement. 2017. 176f. Tese (Doutorado em Filosofia) – University of Wisconsin, Madison, EUA, 2017.

GAZIEL, H. H. O clima psico-social da escola e a satisfação que os docentes do segundo grau encontram no seu trabalho. *Le Travail Humain*, v. 50, n. 1, p. 35-45, 1987.
GOMES, C. A. A escola de qualidade para todos: abrindo as camadas da cebola. *Ensaio*: Avaliação e Políticas Públicas em Educação. Rio de Janeiro, v. 13, n. 48, p. 281-306, jul./set. 2005.

HAIR, J. F.; BLACK, B.; BARDIN, B.; ANDERSON, R. R.; TATHAN, R. L. *Análise multivariada de dados.* 6. ed. Porto Alegre: Bookman, 2009.

HOY, W. K.; HANNUM, J. W. Middle school climate: an empirical assessment of organizational health and student achievement. *Educational Administration Quarterly*, n. 33, p. 290-311, 1997.

JANOSZ, M.; GEORGES, P.; PARENT, S. L'environnement socioéducatif à l'école secondaire: un modèle théorique pour guider l'évaluation du milieu. *Revue Canadienne de Psycho-Éducation*, v. 27, n. 2, p. 285-306, 1998. Disponível em: http://www.f-d.org/climatecole/Janosz-article-1998.pdf. Acesso em: 21 nov. 2008.

LANE, S. *School culture and climate at a middle school in Maine*. 2017. 172f. Tese (Doutorado em Educação) – Northcentral University, Prescott Valley, Arizona, EUA, 2017.

LORENZO-SEVA, U.; FERRANDO, P. J. FACTOR: A computer program to fit the exploratory factor analysis model. *Behavior Research Methods*, v. 38, n. 1, p. 88-91, 2006.

LORENZO-SEVA, U.; TIMMERMAN, M. E.; KIERS, H. A. The hull method for selecting the number of common factors. *Multivariate Behavioral Research*, v. 46, n. 2, p. 340-364, 2011.

LOUKAS, A. What is school climate? High-quality school climate is advantageous for all students and may be particularly beneficial for at-risk students. *Leadership Compass*, v. 5, n. 1, 2007.

MELO, S. G. *Relação entre clima escolar e desempenho acadêmico em escolas públicas de ensino médio representativas de um estado brasileiro.* Dissertação (Mestrado) – Universidade Estadual Paulista "Júlio de Mesquita Filho", Marília, SP, 2017.

REYNOLDS, K. J.; LEE, E.; TURNER, I.; BROMHEAD, D.; SUBASIC, E. How does school climate impact academic achievement? An examination of social identity processes. *School Psychology International*, v. 38, n. 1, p. 78-97, 2017.

SHERBLOM, S. A.; MARSHALL, J. C.; SHERBLOM, J. C. The relationship between school climate and math and reading achievement. *Journal of Research in Character Education*, v. 4, n. 1/2, p. 19, 2006.

TABACHNICK, B. G.; FIDELL, L. S. *Using multivariate statistics*. 5. ed. Boston: Allyn and Bacon, 2007.

THAPA, A. School climate research. *In:* DARY, T.; PICKERAL, T. (ed.). *School climate practices for implementation and sustainability.* New York: National School Climate Center, 2012. (A School Climate Practice Brief, n. 1).

THAPA, A.; COHEN, J.; GUFFEY, S.; HIGGINS-D'ALESSANDRO, A. A Review of school climate research. *Review of Educational Research*, v. 83, n. 3, p. 357-385, Sept. 2013.

THIÉBAUD, M. *Climat scolaire*, 2005, p. 1-6. Disponível em: http://www.relationsansviolence.ch/climat-scolaire-mt.pdf. Acesso em: 12 out. 2015.

VALENTINI, F.; DAMASIO, B. F. Variância media extraída e confiabilidade composta: indicadores de precisão. *Psicologia:* Teoria e Pesquisa, v. 32, n. 2, p. 1-7, 2016.

VINHA, T. P.; MORAIS, A.; MORO, A. *Manual de orientação para a aplicação dos questionários que avaliam o clima escolar*. Campinas: FE/Unicamp, 2017. v. 1.

VINHA, T. P.; MORAIS, A.; TOGNETTA, L. R. P.; AZZI, R. G.; ARAGÃO, A. M. F.; MARQUES, C. A. E.; SILVA, L. M.F.; MORO, A.; VIVALD, F. M. C.; RAMOS, A. M.; OLIVEIRA, M. T. A.; BOZZA, T. C. L. O clima escolar e a convivência respeitosa nas instituições educativas. *Estudos em Avaliação Educacional*, São Paulo, v. 27, n. 64, p. 96-127, jan./abr. 2016.

WARNER, L.; HEINDEL, P. Student Success Built on a Positive School Climate. *The Education Digest, Ann Arbor*, v. 82, iss. 7, p. 10-15, March 2017.

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