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High-quality teachers in low-quality schools: understanding the variation in teaching quality in low-achieving Chilean schools

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ABSTRACT

The aim of this study is to understand the strengths and weaknesses of schools and provide inputs to better inform both research and public policies. To address this aim, 258 low-achieving Chilean primary schools and their 1,266 teachers were analysed. On the basis of a multilevel latent class analysis, we found four profiles of teaching practices. The proportion of teachers in the high-quality teacher category is unexpectedly high (38.37%), followed by the low-quality (25.61%), content-oriented (18.91%), and climate-oriented (17.12%) categories. Finally, several school-level variables were tested to explore the link between school practices and teaching quality categories. The results show that the quality of the school's teaching practices related to their support for behavioural issues is associated with the probability of teachers belonging to the low-quality or climate-oriented categories. These findings can be valuable for policymaking, as they call for the development of strategies that strengthen teachers' capacities within schools.

KEYWORDS

Teaching practices profiles; latent class analysis; low-achieving schools

Introduction

Schools are the most basic organisational units in educational systems and the focus of both policy and research. In the school effectiveness framework, studies on schools focus on understanding how school characteristics are related to student outcomes (Reynolds et al., 2014). Teachers, in this framework, are also investigated in terms of their effectiveness in promoting student outcomes. The research fields of school and teacher effectiveness have provided valuable insights for understanding how to improve educational opportunities for children, focusing on the processes that develop within schools beyond contextual factors (Scheerens, 2016, Chapter 5, p. 105).

School and teacher effectiveness studies almost exclusively follow a variable-centred approach that uses regression type of analyses to identify the main predictors of student outcomes, thereby assuming that the population is homogeneous with respect

to the relationship between the measured variables (Masyn, 2013). This variable-centred approach can measure the degree of variation in teaching quality by analysing aggregated data but cannot describe or classify heterogeneity within the same school. It is important, however, to understand how categories of teachers, in terms of their quality, are distributed in order to gain a better understanding of how schools are equipped to offer better educational opportunities to their students.

The current study offers a different but complementary perspective to school and teacher effectiveness by using a person-centred approach that can provide different information on the same population of variable-centred approach studies. Person-centred approaches, such as the latent class analysis (LCA) used here, look to understand how individuals are grouped into categories according to different patterns of survey answers or observed behaviours. This approach assumes that the population is heterogeneous in relation to the variables of interest, and focuses on understanding individual or group differences (Reichert, 2016).

Following such person-centred approach, this study has three main aims. First, it seeks to understand how teachers are classified according to the quality of their classroom interactions, as measured by a standardised observation protocol by the Agencia de Calidad de la Educación (ACE; National Agency for Quality Education). Second, the study sets out to describe different categories of teachers and their distribution over different categories of low-achieving schools. Finally, the current study aims to provide an account of the school variables that explain differences in the composition of schools in terms of the teaching quality categories, such as principal's leadership and expectations, work environment, didactical resources, and other factors.

Literature review

School and teacher effectiveness has been a cornerstone of educational research around the world. On the one hand, school effectiveness has identified educational quality as a school attribute. For example, in research on both school effectiveness (Goldstein & Woodhouse, 2000; Levin, 2006; Pérez et al., 2004, Chapter IV, pp. 76–105) and school choice (Chubb & Moe, 1988; Davis, 2014; Friedman, 1962, Chapter VI, pp. 85–107; Gallego & Hernando, 2009; Hernández & Raczynski, 2015), it is implicitly assumed that the quality of education is a school feature. The literature on school effectiveness has consistently found that there are key school attributes related to student outcomes, such as the role of the principal's leadership and expectations, shared pedagogical guidelines, collaborative school environments, good climate, and parental participation, as well as the availability of basic infrastructure and resources.

The field of teacher effectiveness has focused on studying generic characteristics of teachers and classrooms that are related to student outcomes and has paid attention to differential teacher effectiveness (Muijs et al., 2014). This situation is well exemplified by research concentrated on understanding differential teacher effectiveness across subject domains (Charalambous et al., 2019). This has provided a more complete image of teaching practices that influence students' learning and help to improve policy interventions. For example, the Measurement Effective Teaching (MET) project in the US, aimed at studying how observed teacher measures are related to student achievement gains through an experimental design, giving researchers the possibility to test causal

hypotheses (Kane et al., 2013). Another study that has given relevant insight into differences among teachers within the classroom is the Teaching and Learning International Survey (TALIS), a self-reported large-scale survey that compares teaching practices between 34 countries at an international level (Organisation for Economic Co-operation and Development [OECD], 2019).

A review by Muijs et al. (2014) described the most relevant factors found in the area of teacher effectiveness. These are learning opportunities, instruction and interaction, classroom climate, and teacher expectations. Finally, and relevant for our study, a large-scale Latin-American study conducted in 2015 (Treviño et al., 2015), found that, among others, classroom climate, availability of resources in the classroom, teachers' effective use of time, and school infrastructure are related to student achievement.

Describing heterogeneity on teaching practices through a person-centred approach

As can be concluded from the above, research on both school and teacher effectiveness has usually followed a variable-centred approach, which has offered key insights into the factors that relate to student outcomes. This research perspective can be complemented with a person-centred approach that focuses on characterising teachers in terms of their teaching practices quality in order to categorise them in profiles. Then, this approach can be used to study the distribution of these profiles within schools through a multilevel model. This complementary approach offers insights to better understand schools as organisations with potential heterogeneous teaching capacities among their teachers. Furthermore, it also helps us to understand how schools are composed, identifying strengths and weaknesses within the schools' teaching force as a diagnosis for embracing improvement initiatives, allowing policymakers to offer recommendations for schools that consider the differential teaching capacities within the school and between schools.

Although the person-centred approach has been widely used in areas such as psychology and medicine, its use is not yet common in the educational area. Some recent studies have used latent class analyses to explore typologies of teachers or students, but the variables used as class indicators are generally sociodemographic measures, or self-reports stemming from surveys that do not address the most relevant factors found in the area of teacher effectiveness (e.g., Boutin-Martinez et al., 2019; Fagginger Auer et al., 2016; Kim et al., 2018; Nasiopoulou et al., 2019).

To our knowledge, to date no research has systematically analysed both the variability of teaching quality within schools based on standardised observations of teacher practices and the school factors that may explain differences in the teaching quality composition within schools. Given that there is scant research on the factors that describe the variation of teacher quality within schools, this study integrates an analysis of the emergent categories of teachers distinguished by the quality of their teaching practices.

The Chilean context

The Chilean school system has high socioeconomic segregation (Valenzuela et al., 2014), and learning outcomes are strongly correlated with socioeconomic status (SES; Mizala & Torche, 2012). In order to help improve the quality of education in Chile, the ACE was

created in 2012, which in turn created a school quality index to categorise schools to inform policy. The Chilean school quality index is mainly defined by students' performance in national standardised tests, combined with other school factors like climate, healthy lifestyle, academic motivation and self-esteem, and civic engagement. Schools are defined as low-quality schools if their performance is lower than expected for their socioeconomic level. Most of the schools categorised as low-quality schools teach students from the lowest socioeconomic levels. For the educational policy, it has been a permanent challenge to improve the quality of these schools. Therefore, this study addresses teaching practices in this population of schools, which is a relevant variable for school improvement.

This study

The present study aims to fill the literature gap to understand how teaching quality varies within the same school, and which factors are related to this variation. Specifically, the study focuses on a sample of low-quality index schools in Chile and uses a person-centred approach to answer the following research questions:

- (1) What are the teaching quality profiles that characterise teachers within low-achieving schools?
- (2) How are the teaching quality profiles distributed over different categories of low-achieving schools?
- (3) What is the association in low-achieving schools between school-level factors and the probability of a teacher belonging to a specific teacher profile?

Method

Sample

This study used a sample of Chilean primary schools defined as low-quality schools by the ACE, which are schools with academic or personal and social development indicators below what is expected given the socioeconomic level of their student population. The ACE is a public entity that was created to ensure educational quality in all Chilean schools. To accomplish its objective, the ACE measures student learning as an indicator for school performance through a standardised test known as Sistema de Medición de la Calidad de la Educación (SIMCE; System for the Measurement of Educational Quality). Also, the ACE visits schools in the lowest range of the quality index every 2 years. The sample used in this study corresponds to schools throughout Chile with an insufficient performance level in the quality index defined by the ACE. The schools in this sample are mainly classified as underperforming (65.77%), with others classified as medium-low (34.23%) in the school quality index defined by the ACE. Most of these schools (88%) serve students with low or medium-low SES, which is important contextual information to consider in the results and scope of this work. The ACE estimates students' SES through a cluster analysis, obtaining five unbalanced socioeconomic groups that are different from the traditional quintile method (ACE, 2013). Characteristics of the groups with low and medium-low SES are the incomplete schooling of parents

Table 1. Frequency of classroom observations by grade and subject.

Grade	Subject					Total
	Mathematics	Language	Natural Sciences	Social Sciences	Other ^a	
1	41	57	20	7	17	142
2	41	47	11	17	26	142
3	43	43	12	20	26	144
4	40	35	33	22	24	154
5	38	28	23	25	38	152
6	34	42	24	23	30	153
7	41	40	21	34	41	177
8	52	51	30	35	34	202
Total	330	343	174	183	236	1,266 ^b

^aOther subjects observed are foreign language (English), music, visual arts, and physical education.

^bThe 1,266 classroom observations come from 258 schools with a low-quality rating measured by the Agencia de Calidad de la Educación.

(<12 years) and family income equal to or less than the national minimum wage. Regarding the type of school, 80.77% of the schools in the sample are public, and the rest are private subsidised. Only 10.38% of the schools were classified as being rural in contraposition to the urban condition.

During these school visits, an evaluation team composed of three educational experts collects information through interviews and surveys with diverse agents in the schools (principal, parents, students, teachers, and others), as well as classroom observations using various instruments. The observed lessons are encoded using a standardised observation protocol based on an education policy guideline document called Educational Performance Standards (EPS) developed by the Chilean Ministry of Education (Ministerio de Educación, 2014). The EPS describes four ordinal levels of quality for a range of school and teacher practices, ranging from (1) weak to (4) advanced. The information regarding teacher practices collected during these school visits constitutes the data of this study.¹

The teaching practices analysed in this research comprise 1,266 teachers working in 258 schools visited between 2014 and 2016. The average number of observed classrooms per school is 4.87 ($SD = 2.37$), with grade level and subject domain varying across the observed lessons (Table 1). The selection of classrooms observed within each school is randomised.

Teacher-level indicators and school variables

Teacher-level indicators

During the ACE's school visits, the evaluation teams observe teacher practices included in the EPS document, which comprises four dimensions: Leadership, Pedagogical Management, School Environment, and Resources Management. Each of these dimensions has three subdimensions. As our aim is to study teaching quality, teacher-level indicators were selected from the dimensions of Pedagogical Management and School Environment. Within these two dimensions, there are practices that refer to teacher actions in the classroom, classroom infrastructure, or observations of teachers' notes in the classroom. From these two dimensions, we focused on teachers' actions in the classroom only and selected teachers' practices that are effective in promoting student learning according to the teacher effectiveness literature (Hattie, 2009; Muijs et al., 2014). These

Table 2. Teacher-level indicators.

Indicator name	Summary criteria
Clarity	Teacher presents the contents in a clear manner.
Dynamism	Teacher conducts lessons dynamically.
Exposition	Teacher presents content and develops skills through effective strategies.
Elaboration	Teacher allows students elaborate information through effective strategies.
Practice	Teacher allows students to practise skills in a guided and autonomous manner.
Interest	Teacher shows interest and concern for students.
Monitoring	Teacher continuously monitors students' understanding and performance.
Feedback	Teacher provides feedback to students on their performance individually and in groups.
Time management	Teacher shows good classroom management using most of the lesson time in teaching-learning processes.
Dedication	Teacher motivates students to work hard in their lessons.
Independent study	Teacher helps students to develop the ability to work and study independently.
Expectations	Teacher acts according to the belief that students can change.
Courtesy	Teacher demands that students respect basic standards of civility and courtesy.
Routines	Teacher establishes routines to regulate certain activities and everyday situations.
Opinion	Teacher encourages students to express their ideas and opinions.

Note: See Escribano et al. (2020) for more details.

practices are related to feedback and learning monitoring, the structure of instruction, clarity of presentation, classroom management, and classroom environment. A successful and robust implementation of these practices is expected from a high-quality teacher. These teacher practices were operationalised² in the EPS in 15 indicators (see Table 2).

The data were collected by the ACE evaluation team using a structured observation instrument (O'Leary, 2013). This instrument includes a structured observation guideline for the practices mentioned in the EPS document (see Table 2). The information on the teaching practices is collected through direct observation of a teaching lesson by the ACE evaluators and is recorded as written descriptive notes for each practice observed. The research team had access to the raw written descriptive notes per each classroom observed by the ACE evaluation team, so the coding process was conducted for the teacher level. Based on this information and using the classification criteria from the rubric found in the EPS document, it was possible to obtain the teacher values for each indicator for each of the 1,266 observed classrooms. To obtain teacher values for the observed indicators, it was necessary to code each indicator to the corresponding level of quality of practice. The EPS rubrics have four levels of performance associated with each indicator: weak (1), incipient (2), satisfactory (3), or advanced (4). In the sample used for this study, Level 4 (advanced) was recoded to the third level (satisfactory) due to its infrequent occurrence.³

All the indicators were coded by a primary school teacher who was part of the research team and then validated through the intra-class correlation coefficient (ICC), an inter-rater reliability index (Hallgren, 2012). The validation was done by comparing the codes of 20% of the sample, randomly selected and encoded by the lead researcher. The average of the ICC inter-rater reliability index of the 15 indicators was .81 ($SD = 0.11$), which is considered a good or excellent level of agreement between the two raters (Cicchetti, 1994).

School-level variables

Several school-level variables were used as variables in this study. These variables are school practices observed by the ACE in its visits. Unlike the teacher-level variables, the

Table 3. Selected variables at the school level.

Variable	Summary of criteria
Principal's expectations	The school principal establishes a culture of high expectations in the educational community.
Principal's leadership	The school principal effectively leads the operation of the school.
Shared pedagogical guidelines	The school principal and the technical-pedagogical team agree on the standard pedagogical guidelines for the effective implementation of the curriculum.
School leaders' involvement in the classrooms	The school principal and the technical-pedagogical team support the teachers by observing lessons and reviewing textbooks and other educational materials to improve the learning opportunities of the students.
School leaders' involvement in assessments	The school principal and the technical-pedagogical team coordinate an effective system of learning assessments.
Conditions for teacher collaboration	The school principal and the technical-pedagogical team promote collaborative learning and the exchange of educational resources generated among the teachers.
Promotion of parental commitment	The leadership team and teachers actively promote the involvement of parents in the educational process of students.
Promotion of diversity	The leadership team and teachers value and promote diversity as part of the richness of human groups and seek to prevent any kind of discrimination.
Norms for student–teacher relationships	The school has a student–teacher relationships regulation that explicitly states the rules to organise communal life, disseminates it to the educational community, and demands that it be complied with.
Support for behavioural issues	The leadership team and the teachers can identify and correct antisocial behaviours of the students, from minor situations to more serious ones.
Selection of competent personnel	The school implements effective strategies to attract, select, and retain competent personnel.
Staff development management	The school manages the professional and technical development of the staff according to pedagogical and administrative needs.
Work environment	The school has a positive work environment.
Infrastructure	The school has the infrastructure and equipment required by its norms, and these are in conditions to facilitate student learning and the welfare of the educational community.
Didactic resources	The school has sufficient didactical resources and inputs to enhance student learning and promote their use.

Note. Each of these variables has four possible levels of performance for each indicator: weak (1), incipient (2), satisfactory (3), or advanced (4).

values from each of the 79 variables present in the EPS document were encoded by the ACE team. These 79 variables are distributed among the four main dimensions mentioned in the previous section. Considering the need for parsimony, it was finally decided to consider 15 school-level variables to explore the relationship with teacher class membership (see Table 3).

The process of variable selection was done by the research team, considering the following criteria: (a) theoretical relevance in relation to the context of the sample, (b) 25% or less missing data per variable, and (c) similarity between the constructs of the variables.⁴ The third criterion was applied to avoid the risk of collinearity between variables. The dimensions covered by the 15 school-level variables are principal leadership, curricular management, integral formation, various school climate factors, staff management, and educative resources management.

Statistical analysis

In order to build the teacher typology⁵ based on the quality of observed practices, a multi-level latent class analysis (MLCA) with variables was estimated through a one-step

approach (Asparouhov & Muthén, 2008; Henry & Muthén, 2010; Vermunt & Magidson, 2005) using the software Latent GOLD Version 5.1.

The LCA technique classifies subjects into groups – also named categories or profiles – based on the values of the observed indicators (Masyn, 2013). In each of these categories, the possible value of the ordinal indicator has a specific probability. Therefore, each category has a particular probability-based pattern. In this study, the subjects are the teachers, and the indicators are ordinal variables of 15 observed classroom teacher practices. With this information, nominal latent groups can be estimated.

Usually, observations in educational research violate the independence assumption as teachers (at Level 1) are nested within schools (at Level 2). Leaving the dependence of observations unmodelled often leads to the inflation of Type I error (Snijders & Bosker, 2012, Chapter 2, p. 7). In the last 2 decades, efforts have been made to develop multilevel LCA models in which it is possible to conduct LCA with nested data (Asparouhov & Muthén, 2008; Henry & Muthén, 2010; Vermunt, 2008).

In this study, we fitted a non-parametric model (Henry & Muthén, 2010), where school variance in teacher practices is modelled by discrete latent classes. In other words, this model defines groups at both levels – in our case teacher and school levels – thus allowing mean probabilities of teacher level to change across schools. This means that the school typology will be determined by the different probabilities of the school's teachers being classified in a specific teacher-level latent class.

There is no consensus yet on the appropriate method to be used when explanatory variables are introduced into LCA models (Bolck et al., 2004; Vermunt, 2010). The introduction of variables in the model implies that it is necessary to estimate a measurement model and a structural part. The measurement model refers to the relation between the observed indicators and the latent classes. The structural part of the model refers to relations between the latent class variables and the school-level variables. Traditionally, there are two options to estimate this kind of model: the one-step approach or the three-step approach (Bakk et al., 2013). The one-step model estimates the measurement model and the structural part simultaneously. This approach has the benefit of raising the precision of the classification of Level 1 profiles, but its downside is that the Level 2 variables influence the probability of a teacher being assigned to a specific category. In contrast, the improved three-step model (Bakk et al., 2013) estimates the measurement part first; then, in the second step, the membership of the individuals is fixed to the estimated category in order to later treat the categories as observed variables with a misclassification error. In the third step, this model permits to estimate the relation between the variable and the classification of the teachers in a specific category. The problem with this method, however, is that in this last step, data cannot be treated as nested, ignoring the dependency that exists between teachers within the same school. Thus, in the present study, the one-step approach was preferred. The model specification in the one-step procedure has the advantage of improving the classification of teachers in the different latent classes while providing information regarding which school factors are contributing the most to this precision improvement.

Latent class model selection was made based on three main criteria. The first is the evaluation of measurements of relative fit as the Akaike information criterion (AIC), the individual-based Bayesian information criterion (BIC), and the group-based BIC (Fagginger Auer et al., 2016; Vermunt, 2010).⁶ It is important to mention that the lowest value of these

indices is not always sufficient to identify the number of groups. In some cases, the small decrease of these measures across models does not necessarily justify the extraction of a new group. Second, and complementary to the first point, it is necessary to evaluate the model through a classification diagnostic (Masyn, 2013). This diagnosis is usually made by the entropy indicator (E_K), which assesses the precision of individuals' classification in their categories through the posterior probabilities. Finally, various authors (Henry & Muthén, 2010; Masyn, 2013) strongly recommend evaluating not only model fit indices but also the theoretical and substantial interpretability of the category, and to avoid an extremely disparate proportion of subjects in the different classes.

It is important to note that missing data were present in all teacher-level indicators. The percentage of missing data ranged from 2.32% to 26.51%, with a mean of 13.23% ($SD = 7.12$). Latent GOLD uses full information maximum likelihood estimates with the missing data present on the observed indicators to reduce bias estimation (Vermunt & Magidson, 2013). There were no missing data in the school-level variables.

Results

We estimated a series of LCA models to determine the typology that best represents this sample. At the teacher level, the number of categories varied from one to 10, and at the school level the categories varied from one to three. In Table 4, the fit indices are shown for 18 estimated LCA models. In all the models, both BIC indices show that the solution of teacher-level categories should be with six teacher latent classes. However, from the graph of the relative fit indices (see Figure 1), it is possible to see that the curve of relative indices stabilises at four latent classes of the two school-level categories solution.

Although a solution with four categories is not the solution with the minimum value between the relative fit indices, this solution also has a more substantive and parsimonious interpretation. When the resulting categories in the typologies of five and six

Table 4. Fit statistics for the non-parametric multilevel latent class models.

Latent Classes		Fit indices				BIC	
		Log-Likelihood	Parameters	Entropy	AIC	Individual-based	Group-based
1	2	-13150.98	61	0.93	26423.96	26737.48	26640.69
	3	-12511.38	92	0.88	25206.77	25679.62	25533.64
	4	-12261.24	123	0.88	24768.48	25400.66	25205.49
	5	-12094.28	154	0.86	24496.56	25288.06	25043.71
	6	-11972.82	185	0.84	24315.64	25266.48	24972.94
2	2	-13149.58	63	0.93	26425.17	26748.96	26649.01
	3	-12506.25	95	0.89	25202.50	25690.76	25540.03
	4	-12256.22	127	0.88	24766.45	25419.19	25217.67
	5	-12090.60	159	0.86	24499.20	25316.40	25064.12
	6	-11968.84	191	0.85	24319.68	25301.35	24998.29
3	2	-13149.49	65	0.93	26428.99	26763.06	26659.93
	3	-12504.75	98	0.89	25205.51	25709.19	25553.70
	4	-12252.33	131	0.89	24766.67	25439.96	25232.10
	5	-12086.18	164	0.86	24500.36	25343.27	25083.05
	6	-11962.38	197	0.85	24318.77	25331.28	25018.70

Note: The chosen solution was the one with two categories at the school level and four categories at the teacher level (the row with bold numbers). AIC = Akaike information criterion; BIC = Bayesian information criterion.

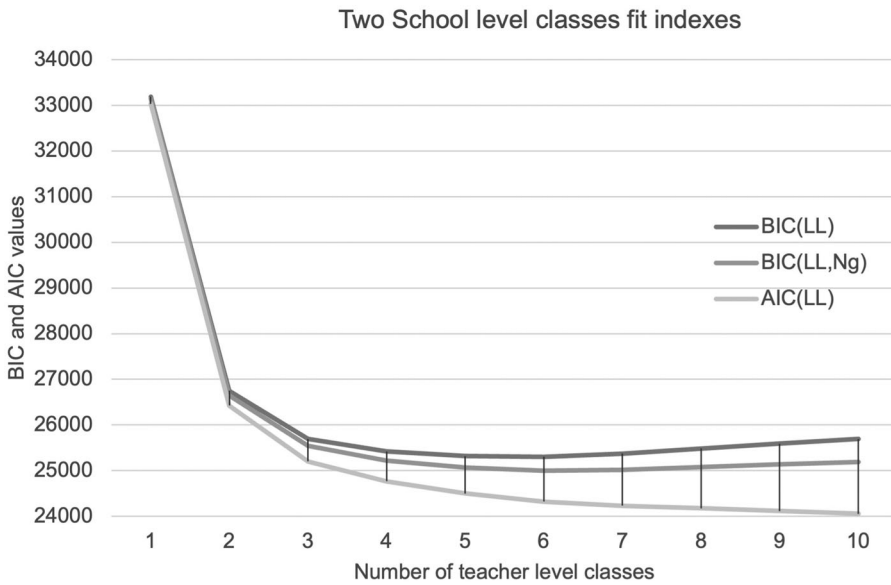


Figure 1. Relative fit indexes values for the two school-level categories.

Note: BIC(LL) = individual-based Bayesian information criterion; LL = log-likelihood; BIC (LL, Ng) = group-based Bayesian information criterion; Ng = number per group; AIC(LL) = Akaike information criterion.

categories at the teacher level are fitted, a duplication of classes is observed; that is, there are categories that have almost the same probability in each of the 15 indicators. Therefore, it was decided to opt for the model of four classes at the teacher level.

To decide the number of school-level latent categories, we carefully studied all possible models with one to three school-level latent classes, and three to five teacher-level latent classes. This implied the inspection of nine different model solutions (3×3). In all possible variations of the number of school-level categories, the four teacher-level categories continued to be the best fitting model. Regarding the selection of the number of school-level categories, in the case of the three school-level categories, the third category grouped only 7% of the schools. For this reason, the chosen typology was with two school-level categories and four teacher-level categories.

Interpreting the teacher-level categories

Figure 2 shows the class-specific item mean probability plot, which shows the average probability of a teacher in each category receiving a satisfactory score in each of the teacher practice items. The teacher categories can be defined as follows:

- *High-quality practices (38.37%)*: The teachers in this group have a high probability (>80%) of being evaluated at a satisfactory level in all 15 practices.
- *Low-quality practices (25.61%)*: The second largest group corresponds to teachers who have particularly low probabilities (<20%) of obtaining a satisfactory level in certain teacher practices. These teachers show a lack of dynamism in their lessons, and they do not provide feedback to their students, their time and

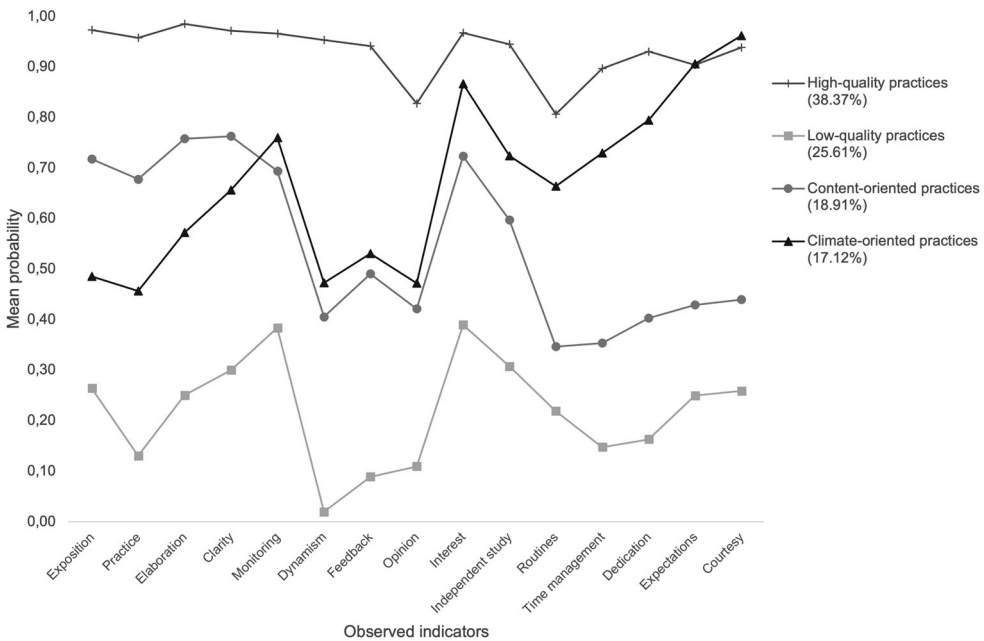


Figure 2. Class-specific item mean probability plot.

behaviour management practices in the classroom are deficient, and they do not promote skill development practices, or encourage their students to pay attention to their lessons.

- *Content-oriented practices (18.91%)*: The teachers assigned to this category have a high probability ($\geq 70\%$) of being evaluated at a satisfactory level in practices related to the delivery of educational content. These practices include the high-quality strategies used by the teachers to present the content, the clarity of their presentation of this content, and their ability to promote student participation in skill-development exercises. Also, these teachers express an interest in the academic development of their students. Another characteristic of this category is that, although all the indicators have high probabilities of being at satisfactory levels, these probabilities are smaller than for the teachers in the first group. However, regarding classroom routines, time management, dedication of students, expectations, and courtesy indicators, the teachers of this category have low probability of being evaluated at a satisfactory level.
- *Climate-oriented practices (17.12%)*: This teacher group is characterised by higher probabilities of being evaluated at a satisfactory level in items related to the climate in the classroom and the relationship between students and teachers. The indicators that differentiate this category, with a high chance ($\geq 70\%$) of being evaluated as satisfactory quality level are appropriate time management, the dedication of students to their independent work, the establishment of routines, and behavioural rules in the classroom. Also, these teachers present a high level of interest and expectations for their students.

School-level categories

Regarding the number of school categories identified, the results show two types of school groups (see Figure 3). For the first school profile A (23.70% of the sample), there are only three of four types of teacher categories, with the *Content-oriented category* not present in this profile. Also, in this type of school, the proportion of teachers with *High-quality practices* is 46.50%, and the percentage of the *Climate-oriented category* is about 25.36%. In the second school-level profile B (76.30% of the sample), all the teacher profiles are present, where the proportion of teachers with *High-quality practices* is 35.80%, while the proportion of teachers in the *Low-quality practices* group and the *Content-oriented category* is 25.00%. These results have to be carefully interpreted because of the low level of entropy at the school level (<.40).

School-level variables that relate with teacher category

In this section, we present the results of the analysis of the association between school-level factors and the probability of a teacher belonging to a specific teacher profile. A Wald test was performed to identify which school practices were significant indicators in relation to each teacher profile, with the high-quality teachers being the reference group. The results of the Wald tests are shown in Table 5.

The “Support for behavioural issues” is the only one variable associated with teachers’ group membership. Even with a Bonferonni correction, since we test effects of 15 variables simultaneously, this effect is significant (i.e., $p < .01/15$). This variable refers to the school team’s capacity to amend any antisocial behaviours of the students. This variable highlights the importance of the actions and goal alignment between the school authorities and teachers in order to accomplish their objective.

The term “antisocial behaviours” groups two main types of actions: The first is minor antisocial behaviour such as rude language, cheating on test, destroying infrastructure, and theft, while the second type is dangerous behaviours such as vandalism, cruelty, carrying guns, violent fights, assaults, and threats. This variable has a positive association

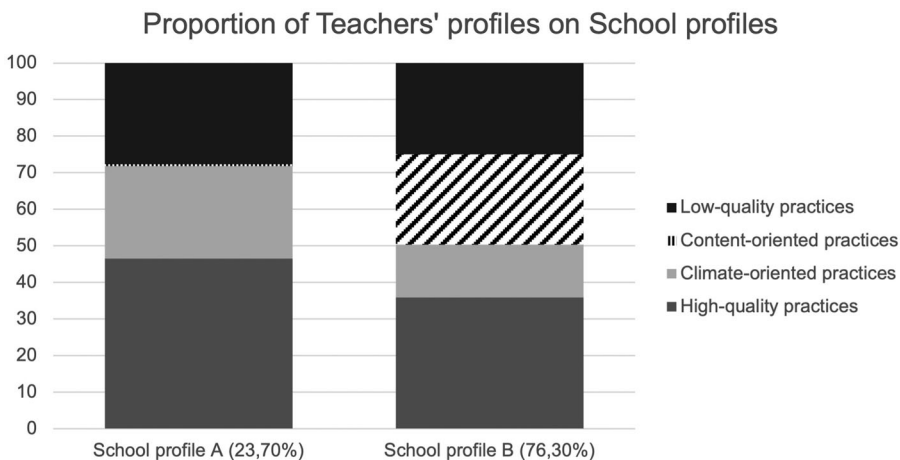


Figure 3. School-level description profiles based on the proportion of teacher categories.

Table 5. Wald test results for determining which school-level variables inform teacher-level practices.

Variables	Low-quality practices profile	Content-oriented practices profile	Climate-oriented practices profile	Wald	<i>p</i> value
Principal's expectations	−0.09	−0.21	0.06	1.58	.66
Principal's leadership	−0.01	0.02	0.07	0.19	.98
Shared pedagogical guidelines	0.07	0.18	0.06	1.07	.79
Leadership's involvement with the classrooms	−0.07	0.04	−0.04	0.38	.95
Leadership's involvement with assessments	−0.12	−0.19	−0.07	1.20	.75
Conditions for teachers' collaboration	0.07	−0.22	0.02	2.45	.48
Promotion of parent's commitment	−0.28	−0.21	0.08	3.92	.27
Promotion of diversity	−0.03	−0.21	0.22	3.32	.34
Normative for relations	−0.09	0.09	−0.36	4.23	.24
Support for behavioural issues	−0.50	−0.07	0.18	14.89	<.01
Competent personnel selection	0.12	−0.03	0.30	3.98	.26
Staff development management	−0.07	0.04	−0.41	5.50	.14
Work environment	−0.26	−0.17	0.03	4.52	.21
Infrastructure	−0.03	0.10	−0.15	0.92	.82
Didactical resources	−0.11	0.19	−0.26	3.89	.27

Note: The high-quality practices profile is the reference profile.

with the Climate-oriented teacher profile. This cluster is characterised by teacher practices that focus on maintaining a pleasant classroom climate and a good relationship between teachers and students. This is a crucially important issue in low-achieving and low-SES schools in Chile (Treviño et al., 2015). Specifically, when we test the contrast between the categories in pairs⁷ for the significant school-level variable, the results show a significant difference ($p = .0012$) between the *Climate-oriented practices* and the *Low-quality practices* clusters, where the value of support on behavioural issues is positively related with the probability of a teacher of being assigned to the *Climate-oriented practices* category instead of the *Low-quality practices* group.

Discussion

This study aimed to offer a complementary perspective to school and teacher effectiveness by using a person-centred approach instead of the variable-centred approach which is widely used in this tradition of research. The person-centred approach has the advantage that it assumes that the population is heterogeneous in relation to the variables of interest, and it focuses on understanding individual or group differences (Reichert, 2016). From this perspective, the purpose was to understand how teacher quality varies within the same school, how the teaching quality profiles are distributed over different categories of low-achieving schools, and which factors are related to teacher quality variation within the schools. To fulfil this purpose, this research explored teacher typologies based on quality indicators of observed classroom practices, the distribution of these typologies across types of schools by applying multilevel LCA, and also the relation of these categories with school factors. As the literature using this methodology in educational effectiveness research is scarce, it is difficult to compare the findings described above with research results from similar studies. For this reason, the

focus of the discussion will be on the importance of these results to better understand the strengths and weaknesses of the teaching force in low-achieving primary schools in Chile.

Interestingly, an unexpected result is the large proportion of teachers in low-quality index schools that exhibited high-quality teaching practices. Previous research showed that there is great variability in the quality of teaching practices across and within schools (Bruns & Luque, 2015, Chapter 2, pp. 97–136; Mansfield, 2015), so it is expected that at least some teachers in these low-quality schools would show good performance in the classroom practices observed. However, what is remarkable is that the teachers with high-quality practices represent almost 40% of the sample. It is important to note that, despite the high proportion of teachers in the high-quality profile, student achievement in these schools is low. There may be two explanations for these findings. First, a high proportion of low-achieving schools are low-SES schools, with Chile being the country where the school SES average has the strongest influence on student achievement in the OECD (OECD, 2016). Second, academic achievement is measured mainly in Grades 4 and 8, and students' results in these grades may reflect the combined effect of the quality of teaching of multiple teachers in each school. Students in schools are subject to the differential quality of teaching throughout their school trajectory because they attend classrooms where they are taught by several teachers, not all of them high-quality teachers. In other words, it can be hypothesised that even though students have some high-quality teachers, the effect of these teachers is not strong enough to compensate for the effects of their challenging context and the effects of having mediocre or low-quality teachers as well. This finding also implies that, when analysing schools, it is important to consider the distribution of capacities of the teaching force to identify with greater precision whether there are thresholds of installed teaching capacities. For example, it could be possible to establish common standards, such as a certain percentage of teachers with at least good-quality practices, and ideally high-quality practices, that would be a minimum for ensuring that schools in challenging contexts can improve.

Our results also complement the traditional way in which the National Teacher Assessment System in Chile defines, evaluates, and acts to improve teacher quality. While the national system defines teacher practices as a one-dimensional continuous variable, teachers' typologies help to better delineate the strengths and weaknesses of teacher practices and provide inputs for designing and implementing effective interventions to strengthen teacher capacities. In a traditional one-dimensional perspective, teachers in the mid-range would be categorised under the same groups, but in our research the profiles illuminate different orientations, such as content-oriented or climate-oriented teachers, providing a more detailed image of the school's workforce. Climate-oriented teachers, for example, demonstrate proficiency in many of the teaching practices, and so efforts in teaching improvement can be better focalised. This finding is relevant for teacher development policy design.

Both findings – the proportion of high-quality teachers and the teacher typologies – are relevant to policymakers, for instance, to develop strategies to strengthen teachers' capacities in a school, for example, through programmes that consider collaborative work between teachers with well-qualified teachers as tutors (Hargreaves & Fullan, 2012, Chapter 6, pp. 103–143). The high proportion of high-quality teachers in these schools can be used to design in-service collaborative professional development, which

has been in the process of being implemented in Chile as part of the new teacher career since 2016. On the other hand, it has been shown that a good teacher in low-SES schools has a more significant impact on student achievement (Torres, 2018). This option may, at least partially, tackle the problem of decontextualisation of educational policies, that is, the danger of designing top-down interventions that disregard local human resources such as high-quality teachers that know and face every day the difficulty of teaching in the context of low-achieving schools.

Another finding is that the only school factor related to the probability of a teacher belonging to a specific teacher profile was the quality of the school environment regarding support for behavioural issues. This finding is complementary to the study of Kuhfeld (2017), which relates results from the Tripod student survey with teaching quality indicators. The Tripod survey is an instrument to measure students' perceptions of teacher quality based on students' observations scores in seven subdimensions (Ferguson & Danielson, 2014; Kuhfeld, 2017). The results of this study show that an adequate classroom climate – and a high overall teacher score in the observed practices by students on the Tripod survey – is positively related to student achievement. Also, the results of our study show specifically that the quality of school support is positively associated with the probability of a teacher pertaining to the *Climate-oriented* profile rather than the *Low-quality* profile. This finding could be very useful in choosing which intervention to focus on, in order to mobilise teachers belonging to the undesirable *Low-quality* category to a better category such as *Climate-oriented*.

The schools in this study have a low-quality index, which is highly related to a low SES. In these challenging contexts, it is not surprising that maintaining a positive climate at the school level is aligned with the probability of teachers maintaining a good classroom climate. The Programme for International Student Assessment (PISA) In Focus document (OECD, 2013) points out that a good school disciplinary climate not only positively influences the academic achievement of the students but can also reduce the impact of SES on students' performance. Finally, it is common that in vulnerable contexts, there are problematic antisocial behaviours that are also related to social exclusion and crime in the neighbourhoods where students from these schools live. Therefore, alignment between teachers and schools is important, but may not be sufficient in all cases to improve school and classroom climate across schools and teachers.

Limitations and future work

The strength of the study was providing an evidence-based concept of teacher quality that provides a more detailed and accurate description of the teacher workforce within schools. The research elicited teacher profiles according to the quality of a set of 15 teaching practices. Yet, the findings of this study should be interpreted in the light of some methodological and conceptual limitations.

The first limitation is that only low-quality schools – according to the ACE index – were studied. This implies that these results cannot be generalised to the complete Chilean school population or school populations elsewhere. A second limitation is that the classroom observation instrument was designed for public policy purposes, not for research purposes. This may have led to data with less precision than data collected with an

instrument developed for research purposes. However, the instrument allowed for reliable coding as shown from high interrater reliability. This is significant because, as stated above, the observation protocol is part of the policy guidelines that teachers and schools in Chile must follow. Therefore, we applied and tested the reliability (ICC inter-rater reliability index) of a policy instrument that could potentially influence the improvement of teacher practices in schools more than any other research instrument.

Future work should be oriented towards expanding the sample size and considering different ranges of SES and learning achievement of the students in order to compare the categories of teachers that emerge from an MLCA. To design policies to improve teacher quality according to these findings, further studies on how focalised interventions have effects on the specific teacher profiles should be conducted. Also, student factors at the individual level greatly impact student–teacher interaction, consequently influencing teaching practices. In future investigations, relevant sociodemographic factors should be considered, such as gender, race, and migratory status, because a teacher could develop a different profile according to the group of students they are interacting with.

Notes

1. This article is part of a doctoral thesis. For this reason, the sample used in this study is the same as the sample of the published article by Escribano et al. (2020).
2. For a more detailed description of this operationalization process, see Escribano et al. (2020).
3. For a detailed description of the coding process and their inter-rater reliability indexes, see Escribano et al. (2020).
4. For example, one variable that was excluded for the similarity between constructs was “The establishment has a school library to support student learning”. This variable can be understood as a subdimension of the more global variable “Didactical resources” used as a school-level variable in this study.
5. We assume that a typology is a collection of categories, that is, different model solutions.
6. Because the models were hierarchical, the Lo–Mendell–Rubin adjusted Likelihood Ratio Test (LMR-LRT) cannot be computed in this case.
7. Bonferroni adjustment was implemented in the pair contrast test. In this case, the p value must be .008 or less to show a significant difference between groups.

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