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The impact of class size on teacher performance in relation to formative assessment in rural schools in Chile

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Abstract
The objective of the study reported on here was to compare teaching performance in formative assessment between monograde and multigrade classes by class size, and to verify whether an association between teaching performance and class size existed in rural schools. A descriptive study was conducted on a representative sample of 539 elementary school students from rural schools in Chile. In monograde classes, better teaching performance was observed in students in large classes (83.3±12.3 points) compared to those in the medium (77.7±14.4 points) and small (77.4±14.4 points) classes ($p < 0.01$). In multigrade classes, the best teaching performance was observed in large classes (75.16±16.0 points), followed by medium (60.9±8.7 points) and small (61.6±18.4 points) classes. However, the results of a comparison between the 2 course modalities (monograde and multigrade) indicate better teaching performance in monograde classes than in multigrade classes. Furthermore, better teaching performance was observed in large classes in both modalities. However, the best teaching performance was observed in the monograde modality. In addition, we verified an association between teaching performance and class size.

Keywords: class size; formative evaluation; monograde; multigrade; performance; rural education

Introduction
Rural schools have been the focus of research in various parts of the world, for example, Europe (Hyry-Beihammer & Hascher, 2015), in developing countries like Chile (Paredes & Pinto, 2009) and in South Africa (Du Plessis & Mestry, 2019; Ngwenya, 2016). Teacher professional development associated with pedagogical performance encompasses multiple educational actions directly related to the curriculum and its development, classroom management, teacher collaboration, and reflection on teaching practices (Vezub, 2010). According to Cotaquispe Guzmán, Soplapuco Montalvo, Rivas Moreano and Vales Gonzales (2021), teacher performance is defined as the performance of an education professional, which is measured in relation to the achievement attained and the various factors that affect their competent performance.

These factors include the mastery of knowledge, the level of pedagogical competencies of the teaching staff, the family, the characteristics of the school, the quality of university training, government programmes, current educational regulations, and co-workers (Contreras Palma, 2006). Other authors also consider class characteristics, cognitive trajectories, class size, teacher methodology, time management, classroom climate, teachers' expectations of their students, continuing teacher education, and facilities and resources (Peniche Cetzal, Mac, Guzmán Ramírez & Mora Osuna, 2020) affecting their performance.

Within this context, there is no consensus on class size as a factor affecting a teacher's pedagogical performance, which has led to the problematisation of the issue in the last 10 to 15 years (Borland, Howsen & Trawick, 2005). Based on this controversy and the literature, two views regarding the importance of class size have emerged. The first holds that class size is important and affects teachers' pedagogical practice – small classes positively affect teaching practice in the classroom (Brühwiler & Blatchford, 2011; Pedder, 2006). The second view holds that small classes do not guarantee good pedagogical performance of teacher practices (Buckingham, 2003; Sánchez Lissen, 2018; Wößmann & West, 2006).

Contextualising rural education in Chile, the Chilean population is mostly urban while the rural population constitutes 14.19% (Williamson, 2003). In the region where this study was performed, the rural population made up one-third of the regional total, corresponding to 36.38%. The Chilean government has made significant efforts to support teachers and strengthen their skills. Since 1999, the Ministry of Education (MINEDUC) has trained 1,000 rural teachers, and others have been sent for internships. According to Baeza (2002) and Pimentel (2002), the impact of this state policy has been diverse and has improved the pedagogical knowledge of rural teachers, resulting in changes in their knowledge and practices. Research on teachers' formative practices in the classroom will not only advance scientific production but also help demonstrate whether the state training policy affected teachers' performance in rural monograde or multigrade schools. Finally, a research gap has emerged in recent years as limited research exists on rurality and teacher performance. With this research, we aimed to help fill this gap by investigating the impact of class size on teacher performance in rural schools. According to the Chilean Ministry of Education (MINEDUC, 2021), multigrade schools are rural education establishments in

which all or some grades from the first to the sixth grade are combined. In case of seventh- and eighth-grade courses, multigrade schools may be combined when any of the following requirements for geographic isolation are met: a lack of other accessible alternatives for the continuation of studies or the socio-economic vulnerability of the population.

Keeping these discussions in mind, the aim of with our research was to compare teaching performance in monograde and multigrade classes by class size and, then, to examine whether an association existed between teaching performance and class size in rural schools in Chile. A review of the relevant literature (presented in the next section) was carried out to contextualise the study and to identifying gaps to be addressed in our study. In the following sections we present the methodology employed in this research, along with the results and further discussion. We conclude the article by discussing the implications of our study and outlining avenues for future research.

Literature Review

Since the 1990s progress has been made regarding school coverage in Chile, and the number of educational establishments has increased. This resulted in a decrease in the number of students per class throughout the education system (Paredes & Pinto, 2009). However, the Supreme Decree of Education No. 8144 of 1980, which establishes 45 students as the maximum number of students per class is still in force. Despite the decrease in the number of students per class, the impact thereof in Chile remains unknown. A brief overview of two views on class size is presented next.

Optimistic view of class size

For Brühwiler and Blatchford (2011), the effectiveness of teaching practice depends on the impact of scaffolding on the learning process, as well as on students' learning strategies, attention, and interest. Thus, class size is a pre-existing condition that influences decision-making. In this sense, the size of the class conditions teaching performance: the larger the class, the greater its complexity, increasing challenges and demands and directly affecting teaching. Under this concept, Borland et al. (2005) argue that class size does influence pedagogical practice, with an optimal range of 21.3 to 23.24 students per class. Accordingly, class size has negative or positive consequences for learning to the extent that it directly affects the pedagogical actions taken by the teacher (Pedder, 2006).

In this scenario, class size conditions teaching and promotes an environment centred on behaviour control and bureaucracy. For example, "in larger classes, more time is needed for non-academic activities, as well as activities related to administrative and organisational procedures and discipline management and control" (Pedder, 2006:224).

For other authors (Brophy & Evertson, 1974; Stallings & Kaskowitz, 1974), a high number of students per class reduces the teacher's direct instruction to students and decreases pedagogical interaction in the class. Although individual work or frontal instruction with minimal teacher accompaniment is encouraged, large classes may lead to students experiencing a range of issues, from a lack of concentration and feedback to disruptive behaviour. On the other hand, Pedder (2006) notes that a high student-to-class ratio forces teachers to manage instructional time in a particular way, focusing on students with greater difficulties or low performance. Pedder (2006) specifically argues that class size affects how information is structured and the teacher's mental schemas, as well as the way in which information is collected (through formative assessment) and how feedback on learning is provided – issues that are crucial to improving student learning. "Teachers in larger classes could reduce the length of curricular interactions by probing students' responses less or offering briefer and more corrective feedback" (Pedder, 2006:226).

Several classic authors found that students' responses and the contributions they make in the class decrease in large classes as students need to mentally analyse the teacher's questions and the incomplete, incorrect, or correct answers of their peers in order to respond, which takes time (Bellack, Kliebard, Hyman & Smith, 1966; Hughes, 1973; Wright & Nuthall, 1970). In large classes, interaction decreases because content and curricular coverage are prioritised, encouraging corrective rather than formative feedback, which often focuses only on correcting the student or identifying errors.

Finally, the Organisation for Economic Cooperation and Development ([OECD], 2005) states that relatively small classes allow teachers to optimise the time available to interact with individual students, which facilitates formative assessment and feedback on learning. Authors such as Blatchford, Bassett, Goldstein and Martin (2003) argue that smaller classes tend to facilitate teacher feedback and greater behavioural control.

Critical view on class size

This perspective establishes a critique of the methodological processes used by researchers on the subject and, consequently, casts doubt on some of the results that have led researchers to conclude that reduced class size benefits students. For Mueller (2013), who has researched class size and its relationship to teaching performance, teachers with fewer years of experience miss out on opportunities offered by smaller classes. Thus,

class size is not as important as teacher quality; the latter being understood as the teacher's adaptability to the environment and the type of students.

Based on this scenario, authors like Wößmann and West (2006) have questioned why class size has no impact in some countries while such a relationship is found in others. They argue that the implementation of policies inspired by reducing class size is more likely to be effective to the extent that teachers structure their classes for small groups. In other words, they change the design and structure of teaching, working differently or adapting to class size. However, teachers more often plan without considering the actual class size and rather project a standard teaching model. Decisions about planning, teaching, and evaluating are based on a hypothetical projection, close to a standardised and homogeneous type of class – almost like the Anglo-Saxon urban model of the early twentieth century. Wößmann and West (2006) point out that the effect of class size on educational production depends on the school system in which it is situated. In other words, competent teachers can promote student learning equally well regardless of class size – they can teach effectively in large and small classes. In this sense, the moderately predictive effects regarding class size cannot be interpreted as a general finding applicable to all school systems.

Within this context, one may argue that the predictive force that influences teacher performance is anchored in the quality of teaching rather than the number of students in a class. "Smaller classes have an observable beneficial effect on student achievement only in countries where the average capacity of the teaching force appears to be low. Assuming that teacher quality is a key input in educational output, this could jointly explain why the impact of class size exists in some countries but not in others, and why countries where there are considerable class size effects exhibit generally poor performance" (Wößmann & West, 2006:727).

Another factor is related to the formative quality of a teacher and his or her vocation. In this sense, Buckingham's (2003) thesis, which holds that the teacher's role and expertise in the process are more important than the size of the class, gains support. The OECD takes a much more balanced position since it considers that class size can be a conditioning factor of school performance to the extent that there is an improvement in educational spending, investment in the system, and thus an improvement in teachers' salary per student (OECD, 2014).

Other authors, such as Sánchez Lissen (2018), emphasise that, along with economic motivations, other human motivational factors contribute to overcoming some of the extrinsic difficulties of a teaching career. In general, countries in leading positions in the Programme for International Student Assessment (PISA) agree that they have strong teacher education systems, however, teachers' pay occupies only a strategic, not decisive, place. Likewise, "the effects of student/teacher ratios as well as class size may impact and affect classroom relationships more than academic outcomes and student achievement" (Sánchez Lissen, 2018:211).

Along the same lines, authors such as Rivkin, Hanushek and Kain (2005), who studied the importance of teacher effectiveness in language and mathematics, found that teacher performance quality yields greater benefits than reducing class size. For Rivkin et al. (2005), teacher quality has a greater impact on learning than class size, and this effect is more pronounced at lower levels. For Buckingham (2003), small classes offer the potential to be more effective but do not guarantee it, since teachers are unlikely to change their teaching styles and classroom management simply as a result of reduced class size.

Consequently, reducing class size will have little or no effect and will not ensure that teachers adopt instruction or management practices proven to be effective in small classes. This substantial investment in professional development, like previous ones, adds to the cost of reducing class size and is likely to be equally effective without changing class size (Buckingham, 2003).

Class size in relation to formative assessment at classroom level

Based on the above, one may argue, as Martínez Rizo (2013:130) states, that the difficulty in implementing formative assessment "is due to the influence on practices of factors of different weight and seniority, which individually could be considered minor, but together form a framework that has proved very difficult to break down." The same author emphasises that the variables with the greatest incidence are linked to two situations: "students" and the characteristics of the "school and classroom." These variables are defined as direct intervening variables that explain the difficulty of formative evaluation practices and teacher feedback. The real characteristics of the students are intervening variables in practice and in the teacher's conception of evaluation, and they have consequences for classroom management and for teaching and evaluative practices.

In their research on formative assessment and the relationship with the number of students, Tavşancıl, Altıntaş and Ayan (2017) found that in Türkiye, formative assessment is mainly used in small classes (15 students per class). On the other hand, Black and Wiliam (1998) point out that when teachers face larger classes, they are less likely to maintain continuous interaction with their students. This reduces the feedback actions in training and

the teaching-learning process, as teachers have fewer opportunities to identify learning achievements, collect information on reasoning, and provide feedback to students.

Rural schools have historically been considered disadvantaged due to the unequal distribution of educational resources (Ngwenya, 2019). It is, therefore, important to investigate their situation to inform future planning and the formulation of public policies related to rural education. In a Chilean socio-cultural and school context, the educational system is developed at both urban and rural levels, and monograde and multigrade classes are generally used. Keeping the above in mind, differences in teacher performance, and an association between class size and teacher performance may exist. Therefore, the objective with this study was to compare teaching performance in monograde and multigrade classes by class size and to verify whether an association existed between teaching performance and class size in rural environments in Chile.

Rural schools are defined as educational spaces rich in pedagogical value and complexity, not limited solely to teaching, but rather where education is intertwined with the social fabric, collaborating with the local community, families, and students, with the aim of addressing the exclusion and inequality that exists between urban and rural areas (Sandoval-Obando, 2020; Santamaría-Cárdaba & Sampedro Gallego, 2020, 2024; Urzúa, Ranjan, Arellano Saavedra & Philominraj, 2024; Vázquez Recio, 2016). In this context, Abós Olivares (2015) and Bernat (2009) argue that rural schools have two options, both of which involve adopting a critical and transformative stance. In this sense, the purpose with this study was to analyse the types of formative practices implemented in multigrade and monograde schools in relation to class size, to characterise the rural school and identify effective practices developed in this type of class. This would allow us to appreciate the benefits of rural education despite the difficulties it faces.

Methodology

Type of Study

The methodology followed in our study is a descriptive quantitative type (comparative-associative). The research is descriptive, aiming to detail the characteristics of a population or phenomenon without manipulating variables. In this research we employed a positivist paradigm, using a cross-sectional design. We examined survey responses using statistical and interpretive analyses.

Participants

We followed descriptive quantitative research (comparative-associative), and the population consisted of 1,800 schoolchildren. The sample was probabilistic (systematic), comprising 539 participants (297 male and 242 female) from rural schools in the district of Longaví (Talca, Chile). This region is in the seventh region (Maule) where the main activities are agriculture and tourism.

The students ranged from 10 to 13 years old and were attending fifth, sixth, seventh, and eighth grades in municipal educational establishments in 2019. These students were characterised by their lower-middle socio-economic status, as they lived in rural areas of the region. The study involved students in two types of classes: multigrade classes (students in different grades in one classroom) and monograde classes (students in a single grade in one classroom).

In Chile, primary education consists of two cycles. The first is the initial primary cycle (Class 1–4), followed by the second primary cycle (Class 5–8). After completing these two cycles, students enter the secondary stage, which consists of 4 years (Class 9–13). The schoolchildren selected for our study were in the second primary cycle. The sample size was determined with a confidence level of 99% and a confidence interval of 0.05 (5%). The sample selected for this study was 539, which is greater than the calculated sample size (485). Table 1 shows the number of students by gender, course, type of class (multigrade and monograde), and class size.

Table 1 Characteristics of the sample studied

Variables	*n*	%
Gender:		
Male	297	55.1
Female	242	44.9
Total	539	100
Grade		
5th Grade	137	25.4
6th Grade	151	28.0
7th Grade	138	25.6
8th Grade	113	21.0
Course modality		
Monograde	205	38.0
Multigrade	334	62.0
Class size		
Small	138	25.6
Medium	104	19.3
Large	297	55.1
Total	539	100

Research Instrument

We used the survey technique and the questionnaire proposed by Cerón Urzua, Cossio-Bolaños, Pezoa-Fuentes and Gómez-Campos (2020) to measure the variable teaching performance in evaluative practices. This instrument has six dimensions (formative evaluation associated with grading, proactive formative evaluation, interactive formative

evaluation, metacognitive formative evaluation, retroactive formative evaluation, and adjusted formative evaluation). The instrument contains 21 questions. The alternatives are presented using a Likert-type scale: 1 – Never, 2 – Rarely, 3 – Occasionally, 4 – Frequently, and 5 – Very frequently. The purpose using this instrument was to determine teachers' performance in relation to formative evaluation.

Performance scores were used to establish performance categories. For the multigrade groups, three categories were used: unsatisfactory (fewer than 57 points); proficient (57 to 81 points); and outstanding (more than 81 points). To determine the performance categories for the monograde groups, three categories were also used: unsatisfactory (below 52 points); proficient (52 to 78 points); and outstanding (more than 78 points). To establish class size, the minimum and maximum numbers of students were used to construct ranges. For multigrade classes, the following ranges were established: small class (fewer than 13 students); medium class (13 to 19 students); and large class (more than 19 students). For monograde classes, the following ranges were established: small class (fewer than 16 students); medium class (16 to 24 students); and large class (more than 24 students). Although no universal norms exist for these classifications, these were used with representativeness in mind to enable comparison among these groups.

Validation of the Instrument

The instrument used in our study has been validated in earlier research (Cerón Urzua et al., 2020) and has been proven to be highly reliable (Cronbach's alpha $\alpha = 0.93$). In the same study, the confirmatory factor analysis (CFA) using structural equation modelling (SEM) was used to validate the questionnaire and the results showed effectiveness of the model and values of each item within accepted ranges: CFI – comparative fit index = 0.967; RMR – root mean square residual = 0.04; and RMSEA – root-mean-square error of approximation = 0.041.

Data Collection and Ethical Considerations

Before formally conducting the research and applying the research instrument, the director of the Education Department of the Municipality (DAEM) was contacted, and a brief presentation of the research objectives was presented. This was followed by obtaining authorisation from the DAEM and subsequent contact with the relevant institutions. Finally, we adhered to ethical considerations in which all participating schoolchildren were informed about the study and assured of confidentiality. Only children who gave consent to participate were included in the study. The entire protocol was conducted in accordance with the Helsinki Declaration for research on human subjects and the requirements of the local ethics committee. After approval by the school director, the instrument was administered in person at the respective schools during class time (08:00 to 12:00). The participating children used pencil and paper to complete the questionnaire. One of the researchers managed the process, explaining the procedures and addressing any questions. The children were allowed 20 to 25 minutes to answer the questionnaire. Only students who were within the established age range and attended school on the day of the evaluation were included.

Data Analysis

The normality of the data was verified using the Shapiro-Wilk test. The Shapiro-Wilk test ($p > .05$) (Razali & Wah, 2011; Shapiro & Wilk, 1965) showed that the data were normally distributed. Descriptive statistical analysis of the arithmetic mean, standard deviation, and range was performed. To compare the monograde and multigrade groups, a *t*-test for independent samples, a one-way analysis of variance (ANOVA), and Tukey's specificity test were used to compare small, medium, and large class sizes. In general, one-way ANOVA was used to evaluate whether a significant difference existed in the variable of interest across three or more groups. As equal variance was tenable, post-hoc comparisons to evaluate pairwise differences among group means were conducted with the use of a Tukey specificity test. The association was verified using X^2. Significant differences were considered $p < 0.05$, and all calculations were performed using the Statistical Package for the Social Sciences (SPSS) 18.0 – a widely used statistical tool for research data management and analysis.

Results

Figure 1 shows comparisons in teaching performance between monograde and multigrade classes by class size. In the monograde classes, better teaching performance was observed by students in large classes (83.3±12.3 points) compared to medium (77.7±14.4 points) and small classes (77.4±14.4 points) ($p < 0.01$).

In the multigrade classes, differences in teaching performance among the three types of classes (small, medium, and large) were observed. The best teaching performance was observed in large classes (75.16±16.0 points), followed by medium (60.9±8.7 points) and small classes (61.6±18.4 points). However, when comparing both course modalities (monograde and multigrade), the results indicate that learners in monograde classes showed better teaching performance than those in multigrade classes ($p < 0.01$).

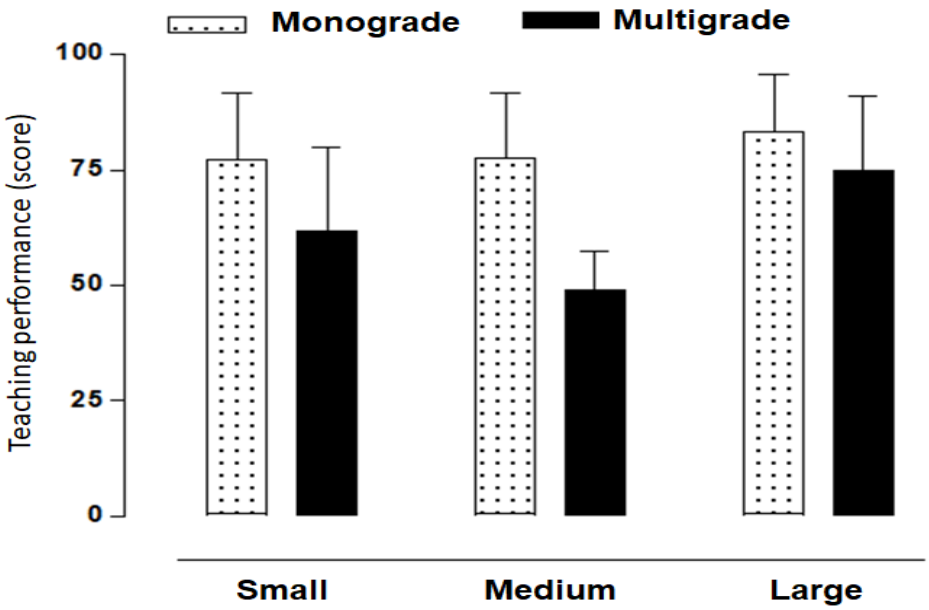

Figure 1 Comparison of teaching performance by class size (monograde and multigrade)

Table 2 represents the association between teaching performance and class size in both types of classes (monograde and multigrade). An association between teaching performance and monograde classes (p = 0.0001) was found, however, there was no association between teaching performance and multigrade classes (p = 0.293).

Table 2 Association between teaching performance and class size (monograde and multigrade)

	Unsatisfactory		Competent		Featured		
Course modality	*n*	%	*n*	%	*n*	%	*p*
Monograde							
Small	8	3.9%	9	4.4%	5	2.4%	0.0001
Medium	21	10.2%	10	4.9%	0	0.0%	
Large	13	6.3%	73	35.6%	66	32.2%	
Multigrade							
Small	13	3.9%	53	15.9%	50	15.0%	0.2933
Medium	5	1.5%	40	12.0%	28	8.4%	
Large	3	0.9%	60	18.0%	82	24.6%	

Note. In monograde (X^2 = 31.44, *df* = 4) and multigrade (X^2 = 4.94, *df* = 4).

Discussion

The findings of this study indicate that teacher performance associated with formative assessment and learning feedback in the participating rural schools varied according to the type of class. In rural, multigrade schools, class size was not associated with teacher performance. However, in monograde classes, performance improved as the number of students in the class increased, indicating an association between the variables studied.

According to Ngwenya (2019), teachers often complain about crowded classrooms, as this requires the use of a variety of teaching and assessment strategies and teachers may prefer to adopt a single teaching and assessment style. However, the results in our study show the opposite. Heterogeneity of classes appeared to encourage the development of an evaluative practice based on evidence and feedback. In the case of multigrade classes, the situation is more complex, as students from two or more grades are taught in the same class, which could be a determining factor with a greater impact than the number of students alone. Multigrade classes are typical of rural regions and are characterised by combined groups of students of different ages and the presence of an individual or only few teachers. This affects the availability of teaching and, at the same time, makes this type of class highly demanding regarding pedagogical design (Boix Tomàs & Bustos Jiménez, 2014).

For Fullan (2005), multigrade teachers must face ongoing challenges of adaptability problems regarding the characteristics of the class and the different levels of achievement established for each grade. Vera Noriega and Domínguez Guedia (2005) argue that the differences between pedagogical practices in multigrade and monograde classes result from the characteristics of the class,

including the presence of more than one grade in the same room and the type and number of students. Furthermore, the realities of multigrade classes differ significantly from pre-service teachers' experiences during their university training. Therefore, when teachers are confronted with the characteristics of a multigrade class, these act as physical variables that condition classroom organisation and influence planning and evaluation. Multigrade classes also have certain difficulties or disadvantages, such as the number of children, the number of grades, and diversity – all of which yield different results among students. In this regard, Du Plessis and Mestry (2019) mention that it is difficult to find teachers who possess the necessary skills to adapt to rural circumstances.

In addition, teachers in multigrade classes, unlike in the monograde classes, face greater demands in terms of didactic evaluative requirements. This may explain the differences observed between the two types of classes. The low performance associated with multigrade classes may be explained mainly by teachers' lack of adaptability to classroom demands, the multiplicity of achievement objectives, and the need to maintain greater control over students. These factors do not favour the accompaniment and feedback that allow teachers to guide their practice and that of their students (Vera Noriega & Domínguez Guedia, 2005).

In this sense, heterogeneity, a defining characteristic of multigrade classes, poses a challenge for teachers. Various authors (Chaparro-Aguado & Santos-Pastor, 2018; Hamodi & Aragués Garde, 2014; Santamaría-Cárdaba & Sampedro Gallego, 2020) argue that teachers who work in multigrade classes must adapt not only to the learning rhythms of individual students but also to the need to collect evidence that shows that students from different grades or courses sharing the same room are learning. For De la Vega (2020), the characteristics of students and classroom conditions compel multigrade teachers to reflect upon and adjust micro-curricular aspects to respond to the uniqueness of learning, while considering the different levels of teaching that coexist in the classroom.

By contrast, monograde classes represent simpler characteristics, as they comprise learners from only one grade and a single achievement objective. This facilitates the adaptability of teaching and evaluation within a class that is considerably more homogeneous than a multigrade class. Monograde classes have developed mainly in urban areas and have become the education model that spread throughout the world in industrialised countries in the early 20th century. It remains a point of reference and a predominant model for school organisation in large cities (Miranda Molina, 2020). The fact that the curricula and pedagogical models have been designed and aligned with monograde classes, is an advantage. In other words, the educational system is arranged around the monograde class.

This facilitates its implementation because homogeneity is a priority, which favours group control, the achievement of a single goal, and internal competition in the class (Abós Olivares, 2015). Therefore, a monograde class has less complexity, resulting in reduced demands on teachers and fewer requirements for situational adaptability. Under these conditions, class size may have a much greater influence on teacher performance as teachers only need to focus on the standardised achievement of learners of a single grade, which optimises planning and allows teachers to teach and, at the same time, collect information, monitor, and have more time to give feedback to students.

We should also note that the specific pedagogical performance examined in this research, which was associated with formative assessment, differs from broader teaching-related performance. A more homogeneous class with a larger number of students could be beneficial for this type of practice. In this sense, a small class size may reduce interaction among students, while evaluative performances may improve with an increase in class size.

A class with a relatively high number of students (24 to 33 students in this study), may favour learning by encouraging divergent thinking and increasing interaction among students and between students and teachers. Within this context, the findings of our study challenge those of several other studies (Angrist & Lavy, 1999; Babcock & Betts, 2009; Hoxby, 2000; Krueger & Whitmore, 2001; Sims, 2009; Wößmann & West, 2006), which have shown that smaller classes have multiple benefits.

This difference may be explained by the fact that the effects of reducing class size should be approached on a country-by-country basis and in relation to each country's educational system. Research results cannot necessarily be generalised to those of other educational systems, particularly when much of the evidence of the effects of class size have originated in industrialised countries.

In Chile, no research exists on the effects of class size on pedagogical practices. The effects of class size in relation to the results of the national standardised test and not pedagogical practices at classroom level, were investigated by only a few researchers (Gutiérrez, Castro & Segure, 2000; Myers, 2004). A possible explanation for the results of our research is that teacher performance improves in large classes due to teachers' adaptive competencies (Brühwiler & Blatchford, 2011). These competencies favour and enable teachers to adapt and respond more effectively to classroom

situations, and facilitate the design, implementation, and evaluation of teaching. The teachers included in our research appear to be better adapted to monograde and large classes than to multigrade and smaller classes.

Globally, rural schools are generally associated with populations living in areas characterised by deficits of infrastructure and services. However, researchers are currently increasingly concerned with reconsidering rural education to re-signify its meaning and generate findings that highlight the value of rural environments and community identities (Gómez-Jiménez & Bautista-Gil, 2024; Santamaría-Cárdaba & Sampedro Gallego, 2020). In the same vein, our study contributes to this broader discussion by examining the rural school, analysing the pedagogical practices carried out by teachers at classroom level, and highlighting their adaptability in these contexts.

On the other hand, the literature reviewed shows a scarcity of research and research gaps in this area (Amaral & Mateus, 2022; Bridgeforth, Kennedy, Alonso & Enoch-Stevens, 2021; Corchón, 2005). For this reason, studies of this nature contribute to highlighting a school system with its own characteristics which deserves greater attention from the scientific community. Findings not only help us to understand the phenomenon but also to appreciate what occurs in rural schools in developing countries – contexts in which teachers may have limited preparation, are poorly paid, but demonstrate a strong vocation for teaching.

Conclusion

In conclusion, the results of our study show better teaching performance in large classes at monograde and multigrade levels, although the best performance was observed in monograde classes, and an association between teaching performance and class size was verified. However, no association was found between teaching performance and multigrade classes, suggesting that teaching in monograde classes with 24 to 33 students may be more effective.

This research is significant as it is one of the first studies on this topic conducted in Chile. It may thus serve as a baseline for later comparisons with other educational contexts.

The study also has some limitations, as we employed a cross-sectional descriptive design that prevents the verification of causal relationships. Future studies could use longitudinal designs to monitor changes over time.

Future research should continue to investigate the factors that affect teacher performance, including other variables highlighted in specialised literature, such as the formative quality of the teacher and their vocation, teaching styles (Buckingham, 2003), and economic motivation (Sánchez Lissen, 2018). Investigating these aspects could contribute to the production of knowledge by broadening understanding of the subject and clarifying the behaviour and relative influences of these on teacher performance. Future studies could also explore other factors that may affect teacher performance in the context of rural education, such as differences in teacher training, availability of resources, or pedagogical strategies.

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Authors' Contributions

CACU – conceptualisation, methodology, data collection, writing the original draft; RR – methodology, data curation, writing, reviewing, editing and visualisation; PPF – writing and preparing of the original draft, supervision, project administration; RGC – methodology, data curation, writing, review and editing, supervision; MCB – writing, review and editing, visualisation, supervision. All authors have read and agreed to the final version of the manuscript.

Notes

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