Instructional Quality and School Climate in Luxembourg's Écoles Fondamentales: Findings from the SIVA Study (Integral version)

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DOI: https://doi.org/10.48746/bb2024lu-en-23

Suggested citation for this document:

Emslander, V., Rosa, C., Ofstad, S., Levy, J. & Fischbach, A. (2024). *Instructional Quality and School Climate in Luxembourg's Écoles Fondamentales: Findings from the SIVA Study (Integral version)*. Luxembourg Centre for Educational Testing (LUCET) & Service de la Recherche et de l'Innovation pédagogiques (SCRIPT). https://doi.org/10.48746/bb2024lu-en-23

This document appears as supplementary material in connection with the Luxembourg National Education Report 2024 – specifically as an integral version of the following article:

Unterrichtsqualität und Schulklima an den Écoles fondamentales in Luxemburg: Ergebnisse der SIVA-Studie

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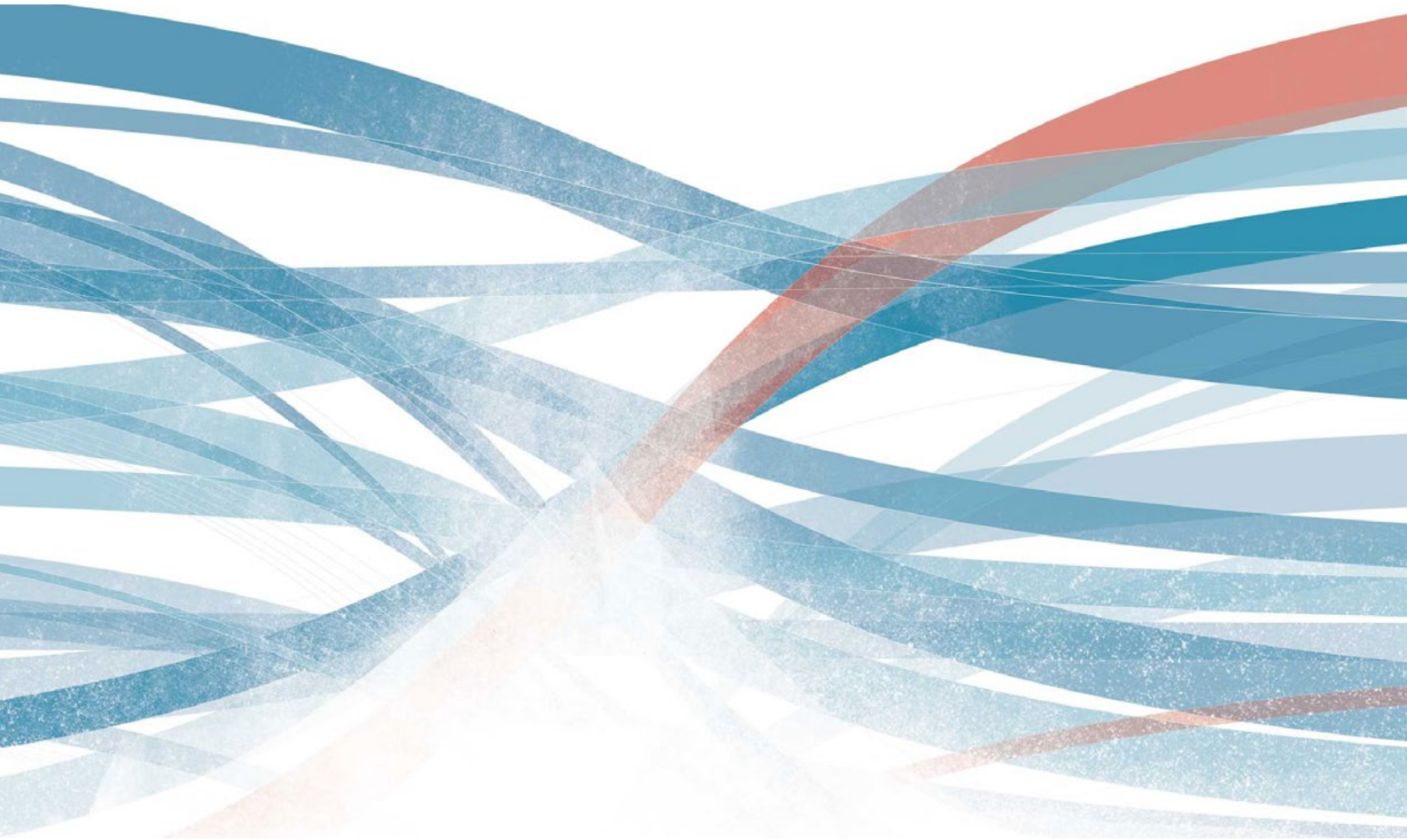

The "Luxembourg National Education Report 2024" is published in German and French and can be accessed at the following link:

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1. Educational Inequalities in Luxembourg

In such a diverse cultural context as Luxembourg, educational inequalities can arise from various factors. For example, the language spoken at home, the migration background, or the family's socio-economic status can impact a child's school success. Also, the educational landscape in Luxembourg is unique due to its linguistic diversity, with three languages of instruction in the traditional public education system: Luxembourgish, German, and French. However, only about 32 % of *écoles fondamentales* students speak Luxembourgish, a language of primary instruction, with at least one of their parents as their first language (MENJE & SCRIPT, 2022). This linguistic diversity in Luxembourg means that students bring different language backgrounds to the *écoles fondamentales*. Consequently, these different language backgrounds result in varying preconditions for school success, which impact not only language learning but also subjects like mathematics through the language of instruction and thus shape students' school careers (Hadjar & Backes, 2021). With the growing language diversity and educational inequality, one would expect Luxembourg to perform increasingly poorly in international comparisons. However, the data suggests that Luxembourg remains stable over time in its test results in international comparison studies, for example, in the Programme for International Student Assessment (PISA; Weis et al., 2020). This stability against the odds suggests that there must be factors preventing school success from declining, such as effective strategies to tackle educational inequalities. If we could identify these educational strategies, they could be a starting point for all schools to learn from. Identifying strategies to tackle educational inequality is precisely the goal of our project, "Systematic Identification of High Value-Added in Educational Contexts" (SIVA). Specifically, we wanted to identify educational strategies in dealing with (linguistic) diversity and what other schools might learn from them.

2. The SIVA Project: Identifying Effective Schools

In the SIVA project, we aimed to explore how to mitigate educational inequalities in Luxembourg's *écoles fondamentales*. The project had three key objectives: (1) to identify highly effective schools and compare them with other schools, (2) to collect quantitative and qualitative data in these schools to discover what highly effective schools are doing differently, and (3) to identify strategies that other schools can learn to reduce educational disparities. Collaborating with the *Observatoire National de l'Enfance, de la Jeunesse, et de la Qualité Scolaire – Section Qualité Scolaire (OEJQS)*, the aim was to find the literal needle in the haystack of what makes the *écoles fondamentales* in Luxembourg effectively navigate diversity and bring their students to success. To identify especially effective schools, we used a statistical method called "value-added" (VA) analysis, which aims to identify how much "value" schools can "add" to the achievement of their students.

The idea behind the VA scores is that there are several student factors, such as the students' home language, that the school cannot influence. VA scores account for such factors and approximate the school's influence on students' achievements. To find a school's VA score, the students' VA scores are averaged within a school. This VA score says how well a school helps students thrive independent of their backgrounds. VA scores are widely applied for accountability reasons, for instance, in the US, to compare the value different teachers or schools add to their students' achievements (Amrein-Beardsley & Holloway, 2019). In our project, we used them as a starting point to analyze effective strategies in the school system. We thus selected *écoles fondamentales* with stable high value-added scores and compared them with those achieving stable medium or low VA scores.

3. Methods and Data Collection

To select the schools using their estimated VA scores, we drew on two representative longitudinal data sets of students who participated in the *Épreuves standardisées* (ÉpStan) in Grade 1 in 2014 or 2016 and then again in Grade 3 in 2016 and 2018 two years later. The dataset included the students' math and language achievement and their background variables, such as SES and home language. In a prior study, we found that the stability of VA scores over time and across subjects was rather low when only considering math *or* language as an outcome variable (for a review of research on VA-score instability, see Emslander et al., 2022). It is not possible to infer the cause of this instability with correlational data - it might reflect real changes over time or differences across subjects but could also be due to issues with reliability or measurement error. Thus, for the SIVA project, we decided to use schools that had a stable VA score in *both* math and language. To increase reliability, only schools with a stable high, medium, or low VA score in *both* math and language were considered in this analysis. As such, we identified 16 schools as our sample with stable high, medium, or low VA scores, across math and language, over two years.

After identifying the 16 schools, we collected data in all their 2nd-grade classrooms from January to March 2022. The quantitative data collected included questionnaires from students, their parents and guardians, classroom and subject teachers, school presidents, and regional directors. Additionally, we documented qualitative data within an observational study visiting each classroom for a one-hour math lesson. The qualitative data collection included several aspects of instructional quality, school climate, and language use, among others. During the structured classroom observations, we observed which languages and pedagogical strategies the teachers used. We focused on three essential concepts of instructional quality (after Klieme et al., 2001; Praetorius et al., 2018):

- *student support*: Teachers promoting positive interactions among students and being attentive to students' needs to build strong teacher-student relationships.
- *cognitive activation*: Teachers engaging students in challenging tasks and building on what the students already know.
- *classroom management*: Teachers creating a well-structured working environment with minimal disruption so students know what to do and can concentrate on the learning activities.

Ultimately, the SIVA project draws from multiple data sources, including observations in 49 classrooms across 16 schools. Questionnaires completed by 511 2nd-grade students, 410 of their parents, 191 of their classroom and subject teachers, 14 school presidents, and 13 regional directors. The SIVA sample is close-to-representative of several variables, such as on the schools' gender balance, measures of socio-economic status, and prior achievement. Also, the 16 schools were geographically evenly dispersed throughout the Grand Duchy (for more information on the sample, see Emslander, 2024).
While our sample closely resembles key characteristics of the full population of cycle 2.2, we could only assess a select subsample of schools. In this chapter, we will focus on the quantitative data from the students and teachers. We additionally highlight some qualitative classroom observations and open-text questions to complement the quantitative aspects of learning and help to shed light on the classroom processes.

4. Findings and Implications

4.1. Instructional Quality and School Climate in Luxembourg's *Écoles Fondamentales*

In Figure 1, we summarize the questionnaire results of the 511 students. These results indicate that the students are experiencing a sense of well-being. While their relationships with fellow students are good, the students report better relationships with their teachers, and the teachers enjoy a high level of popularity among students. Whereas it is still discussed what influence teacher-student relationships might have in 2nd grade, teacher popularity is likely to positively influence the students' ratings of teacher-student relationships (Aleamoni, 1999; Emslander et al., 2023). The only aspect that the children perceive as somewhat lower, compared to other strategies of instructional quality, is classroom management, which is followed by cognitive activation and teacher support. This pattern is also found in German studies (e.g., Fauth et al., 2014).

The perspective of the 191 teachers presents a more mixed picture (see Fig. 2). On the positive side, the teachers hold a favorable view of their relationships with students and their own ability to support their students, regardless of their background. However, the teachers perceive a lack of a digitalization strategy, particularly regarding the use of tablets. Additionally, similar to the students' perspective, they find the relationships among students to be more challenging than between students and teachers. Furthermore, teachers report that strategic consolidation phases, in which students reinforce what they have learned, are not very common in their lessons. The teachers reported making even lesser use of advanced organizers, thus not presenting the structure of the learning unit to the students ahead of time. They also identify room for improvement in classroom management strategies but less in cognitive activation and student support. This pattern of classroom management being the least developed of the three teaching strategies—with cognitive activation in the middle and student support as the most

developed strategy of instructional quality—aligns with the observations made by the students in our sample and from other studies (Fauth et al., 2014).

Figure 1: **Student questionnaire results on selected variables (*n = 511*)**

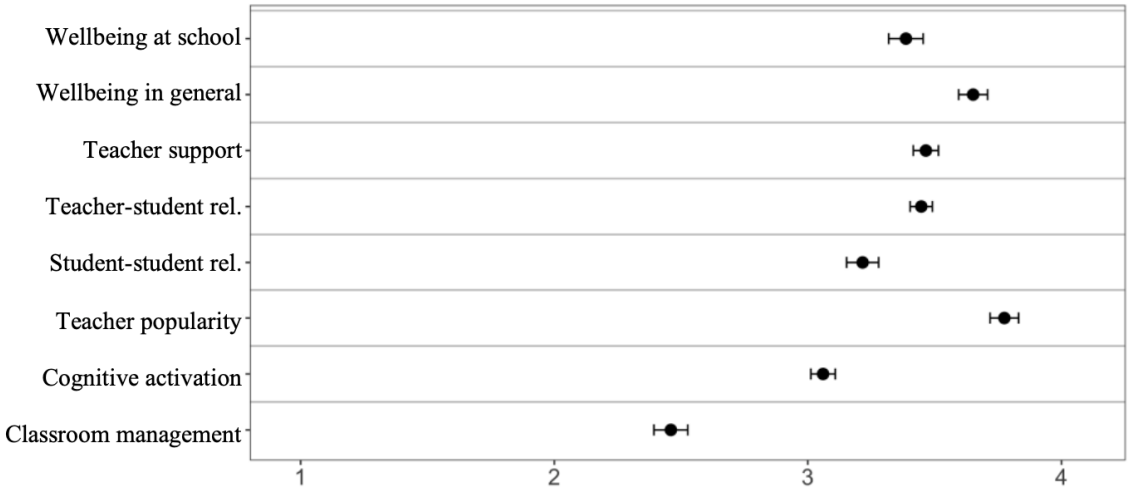
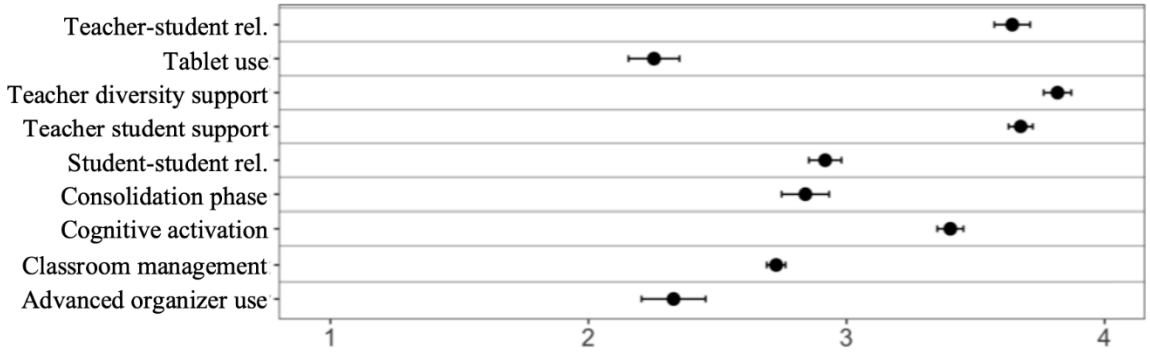


Figure 2: **Teacher questionnaire results on selected variables (*n = 191*)**



Surprisingly, we found no significant differences between schools with high, medium, and low VA scores. This means that the pattern of the results was the same among schools with all types of VA scores, indicating that none of the described strategies seem to be linked to differences in school VA scores (for more information on the statistical tests, see Emslander, 2024). In other words, we did not find any pedagogical strategies or other aspects that set schools with a high VA score clearly apart from other *écoles fondamentales*. Thus, we did not find the figurative needle in the haystack of the quantitative data we investigated.

4.2. What We Observed During the Standardized Classroom Observations

The qualitative part of our study involved classroom observations conducted by two educational experts during one-hour math lessons. We synthesized their ratings, which showed high inter-rater agreement. We observed the language(s) spoken by the teacher during the lessons, during individual explanations, breaks, before and after the lessons (see Fig. 3). Whereas the language of instruction was either "only German" or "mostly German" in most cases, this changed in more informal settings. More than half of the time, when the teacher explained something to an individual student, they used a language other than German. This language diversity reflects the students' multilingual backgrounds and the teachers' willingness to adapt flexibly to their students' language skills or preferences. The language diversity was even higher in informal chatter before and after the lessons or during breaks: About 85% of the time, the students and teachers spoke another language than German. The most popular non-German language was Luxembourgish, followed by French. A few conversations between a teacher and a student were in Portuguese, Italian, or Bosnian.

Figure 3: **Observed language use**

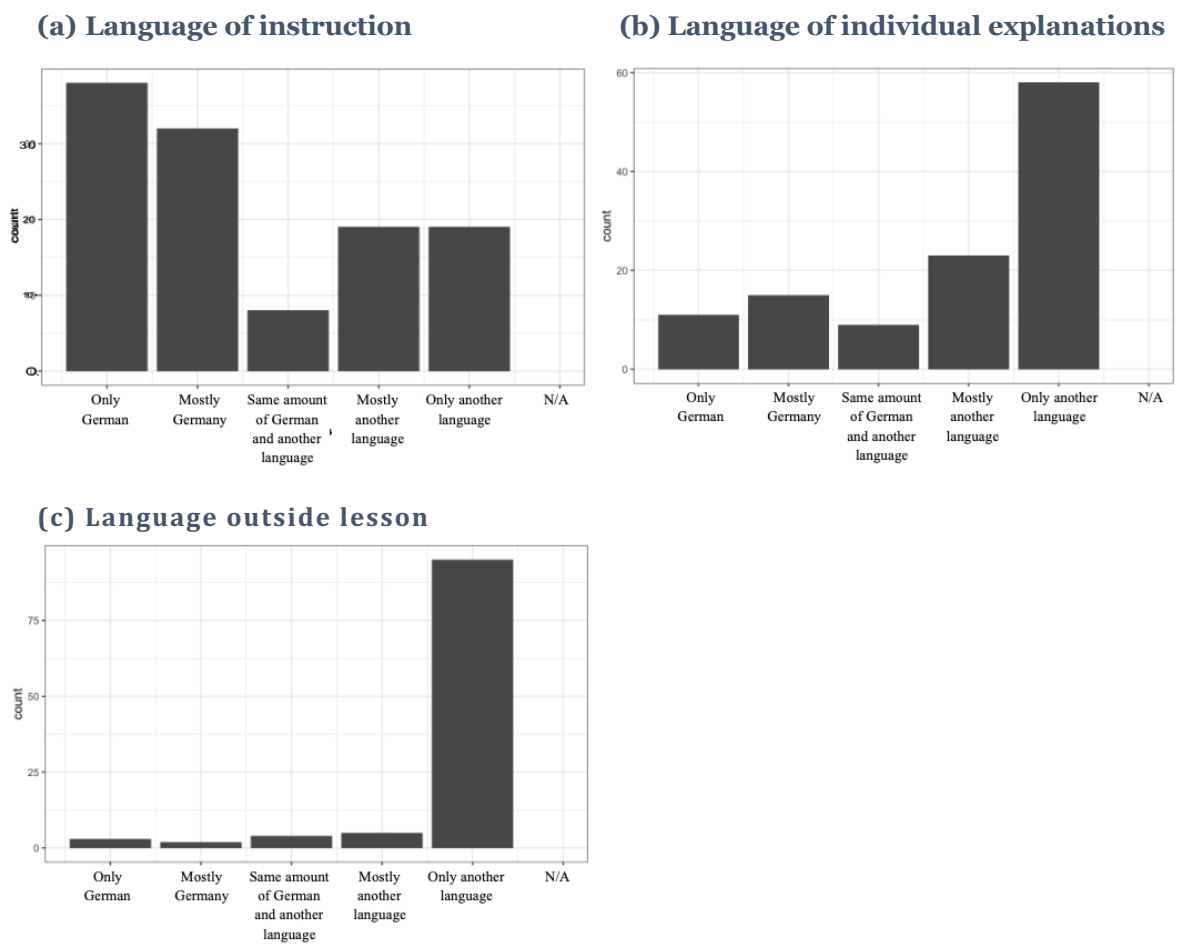
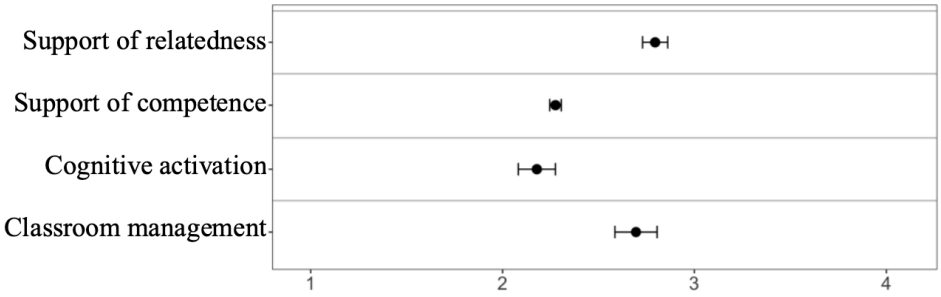


Figure 4 sums up selected variables from the classroom observations. Similar to the students' and teachers' findings, classroom management and cognitive activation appeared less well-developed in the observed lessons. However, the order of importance of the strategies for instructional quality was different. From the classroom observers' perspective, cognitive activation was the least developed aspect, followed by the two other strategies of student support—supportive teacher-student relationships and the teacher's support competence—and classroom management (see Fig. 4).

Figure 4: **Classroom observations questionnaire results on continuous variables (n = 49 classrooms observed with two observers each)**



When comparing schools with a high, medium, or low VA score, we encountered some interesting, yet mostly statistically insignificant, findings. High VA schools demonstrated a higher tendency to use German as the language of instruction. However, in cases where teachers in high VA schools employ other languages, they speak the students' home language. This adaptivity demonstrates a strategic utilization of language diversity. Additionally, it is important to have a fixed language of instruction while remaining flexible and responsive to the linguistic needs of the students. At the same time, it seems that *code-switching* is an asset to the students. *Code-switching* refers to speaking multiple languages in the same situation, such as when a teacher explains a question in Luxembourgish and German (Rampton, 2017). This lively-discussed theory argues that using the students' home language makes them feel safe and valued, which are the prerequisites for deep learning and understanding in diverse societies (Creese & Blackledge, 2015; Lin, 2013). The results of our study support this theory somewhat by indicating that strategic use of *code-switching* might be associated with a higher VA score in a school.

Interestingly, while we observed no significant differences in the quantitative tools assessing pedagogical strategies, we could observe some substantial differences in the qualitative ratings of language use. These differences hint at the importance of conducting classroom observations during on-site school visits to capture unique teaching strategies and identify differences between schools. It is vital to acknowledge the complementarity of methods, with structured observations being particularly valuable in the school context.

As another source of qualitative data, we investigated the open texts the teachers wrote in the questionnaires. Here, three teachers emphasized the need for smaller classes and more teaching personnel to create an effective working environment. Another three teachers urged for a faster

digitalization of teaching and learning materials—they mentioned the lack of tablets and computers—for their students to support teaching 21st-century skills and practical media use. Two teachers further expressed their positive experiences with multilingual teaching and *code-switching* in everyday school life, and another two teachers shared their positive experiences with supportive colleagues, describing teaching as a great job due to the immediate positive feedback. Overall, these answers mirror what we found in the questionnaire results.

5. Conclusion and Outlook

Two key take-home messages emerged from the SIVA project. Firstly, our analyses revealed generally positive perceptions of educational quality among students and teachers. Key findings emphasize the significance of teacher-student relationships while highlighting opportunities for improvement in classroom management strategies. Intriguingly, differences in VA scores did not yield significant variations in most measures, suggesting the presence of other influential strategies in school performance. Our analyses of open-text responses and observations suggested a faster digitalization and the active use of multiple languages, namely *code-switching*, as important strategies to investigate in future research. In the classroom observations, we witnessed many teachers using German as the language of instruction but switching to a student's home language for individual explanations and during breaks.

Secondly, our study showed the importance of incorporating qualitative alongside quantitative data in educational research because it enables a deeper understanding of teaching strategies and school environments. Whereas quantitative analyses, particularly VA scores, help identify overall trends and differences, it is through qualitative observations that we discover subtle nuances and intricacies. Thus, by combining quantitative and qualitative approaches, researchers can comprehensively understand educational contexts and uncover valuable insights to inform effective educational strategies and decision-making. Thus, it is crucial to perform structured classroom observations or teacher interviews to go beyond looking at inputs and outcomes of the educational system and understand the learning processes taking place directly in the classroom.

These correlational findings could suggest implications for educational decision-makers in Luxembourg. Fostering already successful strategies, such as creating positive teacher-student relationships, and addressing classroom management challenges could enhance educational quality. The importance of such actions is supported in the international literature (Emslander et al., 2023). Motivating teachers to stick to the instruction language and, for additional explanations, use their students' home language might help create a welcoming and effective learning environment. Our research also advocates for continued exploration of additional variables potentially influencing educational quality further, such as digitalization and language use. A longitudinal perspective may provide further insights into the evolution of educational dynamics in Luxembourg and could guide future efforts to refine the education system based on causal results. In conclusion, the SIVA project offers a correlative, multifaceted perspective on educational quality in Luxembourg, highlighting the

importance of embracing multilingualism in the proper context and integrating quantitative and qualitative research methods.

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