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Remote Learning During the COVID-19 Pandemic: Evidence from a Three-Level Survey of Italian Schools

Extended Abstract

1. Introduction

The COVID-19 pandemic has been one of the most significant disruptions to global education systems, compelling schools worldwide to transition to remote learning (RL) to ensure continuity in education. In April 2020, over 1.6 billion K-12 learners across more than 190 countries were affected by school closures. By October 2021, nearly a third of countries worldwide had either fully or partially closed schools, underscoring the prolonged impact of the crisis. Italy was among the first European nations to implement nationwide school closures in March 2020, maintaining restrictions longer than most industrialized countries.

The shift to RL presented numerous challenges for teachers, students, and school administrators, particularly concerning organizational decisions, teaching methodologies, and disparities in access to digital resources. While extensive research has examined the pandemic's overall impact on student learning, relatively little attention has been paid to the specific mechanisms underlying these effects. In particular, there is limited evidence on how schools adapted to RL, how teachers managed the transition from in-person to online teaching, and how students perceived the effectiveness of remote education.

This study addresses these gaps by analyzing data from a unique three-level survey conducted in Italian upper secondary schools from March to June 2021. Our survey collected responses from 11,154 students (11th and 13th graders), 3,905 teachers, and 105 school principals, allowing us to examine how schools adjusted their organization to ensure learning effectiveness during RL, how teachers and school principals managed the transition to online instruction, and the perceptions of students, teachers, and school principals regarding the effectiveness of RL.

By leveraging this rich dataset, we assess the effectiveness of different teaching methodologies, the role of school organization in mitigating learning losses, and the impact of RL on educational inequalities. We find that most schools replicated traditional teaching models with minimal adjustments, leading to significant disparities in student outcomes. Moreover, while many teachers believed they possessed adequate digital skills, their actual use of innovative online teaching methodologies was limited. Our analysis also reveals a positive relationship between the adoption of innovative teaching approaches, school-level organizational innovations, and improved student perceptions of learning.

2. Analysis of Results

The findings indicate that despite government recommendations to modify instructional practices, most Italian schools struggled to implement substantial changes. Survey responses show that online activities largely mirrored in-person schedules, with few modifications even

after the initial emergency period. Sixty-five percent of schools maintained their original timetable for RL, while a smaller proportion made adjustments such as reducing instructional hours or prioritizing core subjects. Schools also retained traditional 60-minute lesson structures, with little adaptation to the new teaching context. The Italian Ministry of Education had provided guidelines for Integrated Digital Teaching (IDT), encouraging innovative digital pedagogies, yet the implementation was limited. Frontal lessons remained the predominant teaching method in most schools, with 72 percent of school principals indicating that teachers required support for ICT-based assessment techniques.

The regression analysis provides further insight into the determinants of student learning perceptions during RL. We estimate a cross-section OLS model to examine how various factors influenced students' perceived learning outcomes. The dependent variable measures student agreement with the statement: "During RL, I learned about as much as I would have by going to school." Explanatory variables include an index capturing the use of innovative teaching methodologies, a deprivation index reflecting socioeconomic status, a self-efficacy index measuring student motivation and engagement, and additional controls such as school characteristics and regional fixed effects.

The construction of these indices is based on factor analysis, leveraging multiple survey responses to create composite measures. The innovative teaching index is derived from student responses regarding the frequency of interactive and technology-enhanced teaching practices used during RL, such as online discussions, collaborative projects, and digital assessments. Higher values of this index indicate a greater prevalence of non-traditional, student-centered teaching methodologies. The deprivation index captures material constraints affecting students' ability to engage in RL, incorporating responses about access to digital devices, availability of a quiet study space, and internet reliability. Higher values of the index indicate greater socioeconomic disadvantage. The self-efficacy index measures student attitudes toward learning, persistence, and motivation, including responses on the importance of academic achievement and the perceived ability to succeed in an online learning environment.

Regression results reveal that higher values of the innovative teaching index are positively and significantly associated with students' perceived learning during RL. Schools that adopted more engaging and interactive methodologies saw better student outcomes, suggesting that RL effectiveness depended not only on digital access but also on how teaching was conducted. The deprivation index, by contrast, is negatively correlated with perceived learning, confirming that students from disadvantaged backgrounds experienced greater learning losses. Similarly, the self-efficacy index shows a positive relationship with learning outcomes, indicating that students with higher motivation and confidence adapted more successfully to RL. Additional controls highlight that students in Lyceums reported lower perceived learning losses than those in technical or vocational schools, reinforcing existing disparities in the Italian education system. The lack of organizational changes in school schedules was also negatively correlated with learning perceptions, suggesting that rigid adherence to pre-pandemic structures hindered effective RL implementation. The role of external funding is also significant, as schools that received additional financial support were better equipped to provide resources and training, leading to improved student outcomes.

3. Conclusion

Recent global events have forced schools to significantly reorganize their activities and adopt new learning models. There is now widespread evidence that school closures and the sudden

adoption of alternative teaching methods have negatively impacted student learning outcomes. However, the reasons and mechanisms behind these outcomes have yet to be thoroughly investigated. This study aims to examine the extent to which Italian schools employed new teaching practices during remote learning, how they reorganized their activities, and how these changes influenced students' perceived results. Specifically, the focus is on upper secondary Italian schools and their closure during the second pandemic period starting in September 2020. Our rich dataset enabled us to produce a large set of descriptive evidence that examines some key mechanisms likely to explain the presence of learning loss during the pandemic and provides useful insights. The surveys also investigate the legacy of this COVID-19 experience, and whether it opened up new teaching perspectives in the Italian educational system. Our regression results suggest the presence of non-homogeneous effects on students' learning and offer new insights. This evidence comes from a large and heterogeneous sample of schools, which, compared to the overall population of Italian schools, is somewhat biased towards those with more motivated teachers and students with higher SES and better academic results. If anything, we expect that a balanced sample of the population would have shown even less use in class of the most effective online teaching methods.

Overall, our investigation suggests that the Italian government did not do enough to incentivize continuous, lifelong investment in teachers' training to ensure their digital skills were up-to-date before the COVID shock, while the training offered during the epidemic was most likely not effective and was not implemented with homogeneous standards across Italian schools. This further suggests that the government could have better coordinated activities or, at least, promoted more effectively the dissemination of best practices in online learning.

This study stresses the importance of rethinking how teacher training policies are implemented in a country like Italy, which has the oldest teaching workforce among European countries alongside students' academic performance below the EU average. In this context, it is crucial to consider lifelong learning for teachers regarding innovative teaching practices and new technologies. As mentioned, the COVID-19 experience does not seem to have left a profound mark on Italian schools, which struggled to use innovative methodologies during remote learning and quickly reverted to traditional teaching methods afterward. In conclusion, this analysis provides a framework to understand the implications of the pandemic experience as lived by the schools of a large EU economy, offering a solid basis for further research and food for thought for future studies. Our evidence is relevant not only to the debate on effective strategies to mitigate the effects of the COVID-19 shock on education, but it also provides insights into long-term issues related to the adoption of future innovations in the educational sector. Technological changes are deeply transforming not only workplaces but also the education sector. In a period of rapid and pervasive technological change, with AI rapidly entering our daily lives, teaching innovations may be a powerful tool for improving students' outcomes and educational opportunities. This demands new skills, and equipping teachers with the necessary digital skills should be seen as a strategic policy to enable students to thrive in a continuously changing environment and a necessary tool to reduce inequalities.