

# Digital vulnerability and academic performance in the Spanish regions

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**Keywords:** Digital vulnerability; Educational inequality; Academic performance; Regional disparities; Spain

**JEL Codes:** I24; D63

## Abstract

The rapid digitalisation process currently experienced by societies in developed countries is deepening pre-existing inequalities and generating new forms of social disparity. This trend poses significant challenges for national and regional governments, as well as for supranational institutions, in their pursuit of greater social and territorial inclusiveness and equity. One of the areas in which digitalisation has most strongly intensified social and territorial inequalities is education.

This article aims to analyse the heterogeneity in the digital vulnerability of secondary school students in Spanish regions and its effects in the academic performance. The main objective of this study is to examine school digital vulnerability in Spain from a regional perspective by addressing three key questions:

- (i) whether regional disparities exist in the levels of school digital vulnerability
- (ii) whether distinct regional profiles of digital vulnerability can be identified
- (iii) whether the effects of digital vulnerability on academic performance vary across regions.

To this end, it uses data from the latest edition of PISA available (2022) and employs multidimensional measurements of vulnerability that include material vulnerability, vulnerability in skills, vulnerability in schools and vulnerability in the use of technology. To measure digital vulnerability, a series of indicators are proposed for each dimension, along with a composite index that allows regional disparities to be measured and regional vulnerability profiles to be analysed. Once the levels of material vulnerability have been analysed, different econometric estimates are used to analyse the impact of digital vulnerability on students' educational performance.

The results obtained show the existence of different levels of digital vulnerability among Spanish regions, the existence of different vulnerability profiles, and a negative and heterogeneous impact of vulnerability on educational performance. These results demonstrate the need for asymmetric policies to reduce digital vulnerability and achieve greater regional efficiency and equity in Spain's education system.