



# How Does Education Improve Cognitive Skills? Instructional Time versus Timing of Instruction

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## Abstract

This paper investigates two mechanisms through which education may affect cognitive skills in adolescence, exploiting a school reform carried out at the state level in Germany as a quasi-natural experiment to identify causal effects: between 2001 and 2007, years at academic-track high school were reduced by one, leaving the overall curriculum unchanged. First, I exploit the variation over time and across states to identify the effect of an increase in class hours on same-aged students' intelligence scores, using data on seventeen year-olds from the German Socio-Economic Panel. Second, I investigate the influence of earlier instruction at younger ages, using data from the German National Educational Panel Study on high school graduates' competences. The results show that, on average, neither instructional time nor age-distinct timing of instruction significantly improves students' crystallized cognitive skills in adolescence. Yet, there is suggestive evidence that increasing instructional time may benefit male students exacerbating gender differences in numeracy.

*Keywords:* Cognitive Skills, Crystallized Intelligence, Fluid Intelligence, Skill Formation, Education, High School Reform, Gender Skill Gap

*JEL:* I21, I24, I28, J24

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