Nurturing Curiosity to Enhance Learning in Turkey

Researchers:

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Sector(s): Education

Location: Provinces of Mersin and Adana, Turkey

Sample: About 11,000 primary school students and 425 teachers from 134 schools

Initiative(s): Post-Primary Education Initiative (PPE)

Target group: Children Primary schools Students Teachers

Outcome of interest: Student learning Aspirations

Intervention type: Soft skills Pedagogical innovation

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Partner organization(s): ING Bank

Despite growing primary school enrollment in low- and middle-income countries, many children finish school without basic skills, highlighting the need for more effective teaching practices. In Turkey, researchers evaluated the impact of a new pedagogical approach aimed at cultivating primary school students' curiosity, particularly in science, to improve learning outcomes. Students whose teachers adopted the approach displayed greater curiosity, ability to retain knowledge, and science test scores, with effects persisting into middle school years.

Policy issue

While primary education enrollment is rising in low- and middle-income countries, millions of children leave school without fundamental skills like reading and math. Effective pedagogy can enhance student learning, but there is little agreement on what constitutes good teaching practices. Research suggests that when students are curious or eager to learn, they enjoy the learning process more and retain knowledge longer. However, what teachers can do to cultivate curiosity remains unclear. Can teaching approaches spark student curiosity? Does a greater desire to learn result in better academic outcomes and aspirations?

Context of the evaluation

In Turkey, students complete twelve years of schooling, divided into primary school (ages 6-10; grades 1-4), secondary school (ages 10-14; grades 5-8), and high school (ages 14-18; grades 9-12). Primary education is mainly funded by the government, which also develops a centralized curriculum. Teachers, however, have the flexibility to determine their teaching methods to deliver the curriculum. In primary school, teachers are typically assigned to a single classroom in grade 1 and continue teaching the same students through grade 4. Once students enter secondary school, each subject is taught by a particular teacher. This intervention focused on grade 4 classrooms to ensure full-day contact between students and a single teacher, which is crucial for an effective implementation of the study's pedagogy. Grade 4 also marks the introduction of key science concepts explored in the

intervention.

In this context, the study took place in state primary schools across disadvantaged neighborhoods of the Turkish provinces of Mersin and Adana. The classrooms in the study had an average of 30 students, who were aged around 9 years old on average, with roughly half of them being female.

Details of the intervention

In collaboration with local authorities in Mersin and Adana, researchers evaluated the impact of a pedagogical innovation designed to foster students' desire to learn, or *curiosity*, on their learning and aspirations. The study was conducted over one academic year (October-May of 2018/2019 in Mersin and 2021/2022 in Adana) and involved 134 schools, approximately 11,000 students, and 425 teachers. Researchers randomly assigned schools to receive the intervention either immediately (intervention group) or in later academic years (comparison group).

In intervention schools, teachers who opted into the program received training on using visual and written materials designed to engage students through emotional triggers before introducing complex topics. Training sessions took place early in the academic year (November/October) and focused mainly on science topics. As an example, teachers were guided to show students a short video about space mysteries before explaining the topic of the solar system. Researchers chose to focus on science due to its ability to incorporate mystery and humor more easily than other subjects like math or language. Teachers were expected to implement the prescribed pedagogy throughout the academic year.

To assess the program's impacts, researchers collected data on students' curiosity, knowledge retention, learning outcomes, and educational aspirations. Curiosity was gauged at the end of the school year, by asking students to state their willingness to pay for

one of eight booklets on topics of high interest (e.g., science, history, space), described as containing rare and intriguing facts. Children ranked the booklets and received ten tokens to bid on their favorite, with the option to use the tokens for other gift items instead. Before bidding, they were informed of two possible scenarios to follow: one where higher willingness to pay would increase their chances of obtaining a booklet, and another where booklet distribution would be random. This process aimed to encourage students to express their true willingness to pay for booklets. Researchers converted the number of tokens selected, ranging from zero to ten, into standard deviation units and used it as a metric of curiosity.

To maintain similar exposure to booklet content across intervention and comparison schools, researchers randomly distributed booklets to half of the students in 95 percent of the classrooms. This approach aimed to ensure that differences in booklet knowledge across groups were due to the pedagogy innovation rather than increased access to booklet content, which the intervention could have prompted. One week after the bidding activity, the researchers conducted a 40-question impromptu test about booklet topics to measure knowledge retention.

Researchers tracked learning outcomes by administering tests in math, Turkish, and science before and after the program in both provinces. In Mersin, they conducted a follow-up test almost three years later, which included the booklet questions in addition to math, science, and verbal questions. Researchers also surveyed students' educational aspirations before and after the intervention, asking about their intention to attend university and their planned field of study.

Results and policy lessons

Children exposed to the program exhibited increases in curiosity, knowledge retention, and science test scores, with impacts persisting into middle school years. Educational aspirations also shifted toward STEM fields, though only in the short term, and curiosity gains were particularly meaningful among girls.

Interests and curiosity: Children in the intervention group exhibited a stronger interest in science-related topics and greater curiosity after the intervention. They were 3.8 percentage points more likely to choose a science-related booklet as their preferred option (a 7.8 percent increase relative to the 50 percent average likelihood in the comparison group) and 2.9 percentage points less likely to express no interest in any booklets (a 45 percent decrease relative to a 6.5 likelihood in the comparison group). Meanwhile, interest in non-science topics remained consistent across both groups.

In terms of curiosity, students in the intervention group showed an overall increase in willingness to pay for any booklet by about 0.1 standard deviations relative to the comparison group. This effect was primarily driven by increased willingness to pay for science-related booklets, while willingness to pay for non-science booklets remained unchanged .

Knowledge retention: At the end of the program, students in the intervention group outperformed the comparison group by 0.1 standard deviations in the science section of the booklet test and 0.09 in the non-science section. Long-term, almost three years after the program, the gap increased to 0.16 standard deviations in the science portion of the test, while non-science performance showed no difference.

Learning outcomes: Students in the intervention group saw sustained improvements in science test scores through early adolescence (a 0.07 standard deviation increase relative to the comparison group following the program and three years later). However, there were no meaningful impacts on math and Turkish scores, possibly due to the program's emphasis on science.

Educational aspirations: At the end of the intervention, students in the intervention group were just as likely to state they planned to go to university as the comparison group (around 95 percent). At that point, students in the intervention group were 2.3 percentage points more likely to aspire majoring in science (from a base of 12 percent in the comparison group) and 2.1 percentage points less likely to express a preference for a non-STEM major (from a base of 6.1 percent in the comparison group). These effects faded three years after the program, though such long-term impacts were not as precisely estimated.

Gendered effects: The pedagogy's effects on children's interests and curiosity were mainly driven by girls, though impacts on knowledge retention, learning outcomes, and educational aspirations did not differ by gender.

Cost-effectiveness: The program was quite cost-effective. The cost per student was $3.47 and the cost-effectiveness ratio was 2.1 standard deviations improvements in learning outcomes per US$100 spent, exceeding ratios for other pedagogical interventions previously evaluated.

Policy impact: The program was scaled up in Istanbul primary schools in the 2023-2024 academic year. All comparison schools in Mersin and Adana also received the program in the same academic year, with selected teachers from the intervention schools taking the role of teacher trainers. Teacher training seminars in Istanbul were given sequentially to all grade 4 teachers by researcher Sule Alan.

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