STEM CAREER ASPIRATIONS DURING PRIMARY SCHOOLING

A cohort-sequential longitudinal study of relations between achievement, self-competence beliefs, and career interests

Project presentation

Find out more by following the QR code to the project website: www.jobstem.eu

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HOST INSTITUTION

PARTICIPATING INSTITUTIONS

Abstract

JOBSTEM Project is a **four-year** longitudinal study that aims to address the formation and dynamics of interests for STEM-related fields (Science, Technology, Engineering, Mathematics) during primary schooling by using insights from contemporary theories of academic achievement, self-competence beliefs and vocational interests.

AIMS OF THE PROJECT

- Examine how students' general and specific STEM **vocational interests** are formed and change over time.
- Examine how students' **school achievement** and **self-competence** beliefs relate to their general and specific STEM vocational preferences and how the pattern of these relations changes during primary schooling.
- Examine how students' general and specific STEM career aspirations are shaped by their **families** and their **gender**.

1 Research team

JOBSTEM brings together **14 researchers from 4 countries**: Croatia, France, Hungary and the United States.

Dr. Jacquelynne Sue Eccles – consultant

5 senior researchers:
Josip Burušić
Toni Babarović
Marija Šakić-Velić
Leila Selimbegović
Ina Reić Ercegovac

4 post-docs:
Predrag Pale
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Ivan Dević
Juraj Petrović

4 PhD students:
Mia Karabegović
Mirta Blažev
Mara Šimunović
Tomislav Jagušt

2 Methodological approach

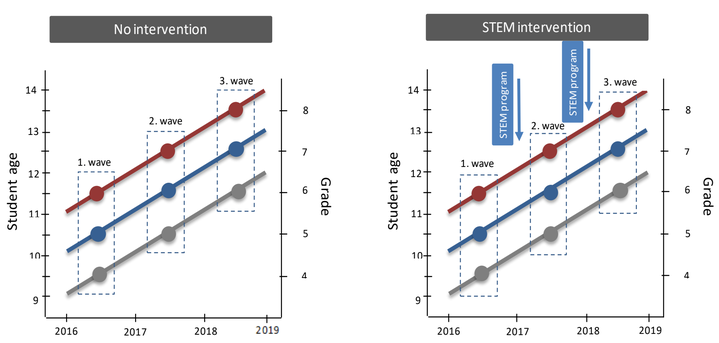
Our study encompasses **longitudinal, experimental (STEM intervention)**, and **qualitative** methodological approaches:

The cross-sequential design includes three cohorts of primary school students assessed through three successive years.

The first wave of measurement included a cohort of fourth grade students (age 10), a cohort of fifth graders (age 11) and a cohort of sixth graders (age 12).

Each cohort is followed through **three measurement waves**: the youngest from grade 4 to 6 (age 10 to 12), the middle from grade 5 to 7 (age 11 to 13), and the oldest from grade 6 to 8 (age 12 to 14). To evaluate the effects of the STEM intervention, this study encompasses two-group pre- and post-test randomized experimental design (Figure 1).

Each STEM intervention in the experimental group is followed by focus groups with students.



Note: *each age cohort is coded by color;** STEM intervention applies only for the half of the students in one cohort (Experimental group)

Figure 1. The longitudinal-sequential design of the study with two-group pre- and post-test randomized experiment

OUTCOMES SO FAR

Children do not perceive STEM interests as a uniform field of vocational interests. They differentiate between interests in Science, Technology, Engineering and Mathematics.

Children's perceptions of parental encouragement of STEM interests mediate the relation between parents' reports on this behavior and children's values of STEM.

No differences in self-concept in science between boys and girls were obtained.

Integrated students' knowledge in the STEM area can be measured with newly developed tests.

JOBSTEM

Boys express more interest in STEM occupations than girls.

There is a "decline" evident in the science self-concept towards higher school years.

Regardless of prior school achievement, students who have stereotype-consistent interests in school subjects tend to show stronger stereotype endorsement.

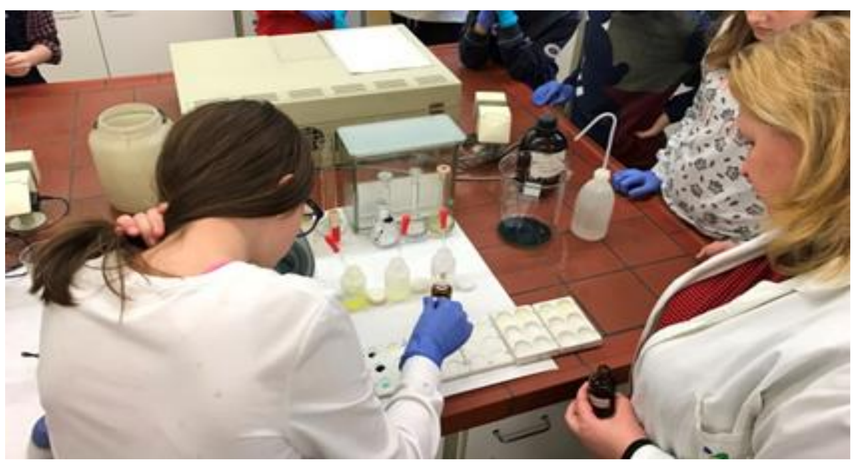
Students are mostly satisfied with the STEM activities of the intervention - they metion increased knowledge and show positive attitudes towards STEM areas.

FUTURE PLANS

- **Building a national STEM platform**
- **Preparing STEM - related materials for classes**
- **Initiating European cooperation**

Observing different crystals under the microscope

Student's work in chromatography method



Workshop on how to chemically asses quality of different types of chocolate

3 Sample

Our sample includes approximately **640 students in three age cohorts**, for a **total of 1920 students**. This sample is divided into two sub-samples depending on their exposure to the STEM intervention.

The **schools were randomly assigned** to experimental and control groups from four clusters of equally urbanized schools. Schools in the experimental and control groups are comparable in terms of socio-economic status of students and their families, as well as availability of information about STEM occupations and exposure to the STEM environment.

For each student, a **parent or guardian** also participates in the study.

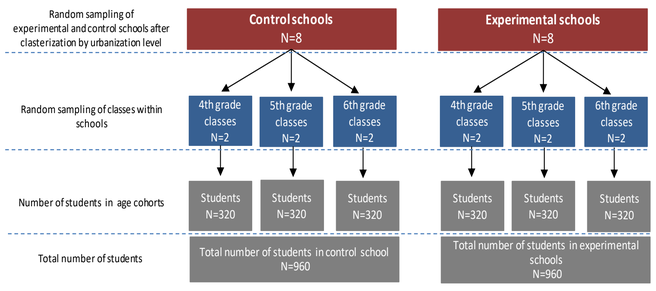


Figure 2. Schema of sampling procedure and number of participants planned in the research

4 STEM experimental program

The main objectives of the STEM intervention were to increase students' interest in STEM subjects, help them develop positive attitudes towards STEM, and give them more information about possible future educational and career choices.

The intervention outcome measures were carefully designed and used to provide data about its possible effects on students' interests, achievements, self-competence beliefs and career decisions. The intervention was implemented twice for the experimental group cohorts and encompassed 12 hours of workshops per student in total.

Intervention activities included STEM workshops in students' schools and visits to higher education and scientific institutions in STEM fields - Faculty of Electrical Engineering and Computing, Faculty of Mechanical Engineering and Naval Architecture, Faculty of Chemical Engineering and Technology and Ruđer Bošković Institute.

PAPERS PRESENTED AT

- European Conference on Educational Research, University UCC, Copenhagen (5 papers) (August 2017)
- New York Academy of Science, New York, USA (April, 2016)
- University College Dublin, Dublin, Ireland (4 papers) (August, 2016)
- The American Educational Research Association (AERA), Washington, USA (April 2016)
- 20th Psychology Days Zadar, Zadar, Croatia (May, 2016)

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