



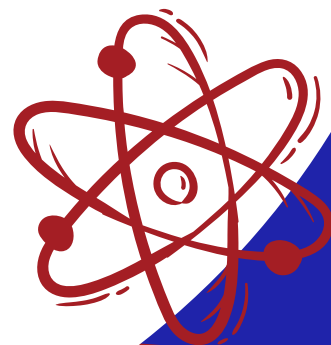
JM Johnson Matthey
Inspiring science, enhancing life

MACEDONIA
2025
Helping Build a Stronger Nation

“Science and Me”

An Opportunity to Improve
Teaching Natural Sciences in
Primary Schools in Macedonia

Science and Me



Skopje, July 2024

Lead Researcher:
Ana Tomovska Misoska

Assistant Researchers:
Zaneta Chonteva and Nena Manchev

Abstract

This report aims to show the effects of the **“Science and Me”** project implemented by Macedonia 2025 with the support of the Johnson Matthey Community Impact Program “Science and Me”. Activities encouraging experiential learning have been implemented in 19 primary schools. The basic findings indicate positive changes in the teaching practices of the teachers involved in the project and a need to continue supporting teachers through similar activities. The main recommendations are:



Continuous support to teachers and project expansion



Investment in equipment and resources



Development of quality teaching materials



Greater support for teacher professional development



Focus on experiential learning

Introduction

The **“Science and Me”** project was implemented by Macedonia 2025 with the support of the Johnson Matthey Community Impact Program. This initiative has covered 19 primary schools, of which 7 in rural areas, and 12 in urban areas. The project activities implemented by the teacher participants have a direct impact on 1005 sixth-grade students who study in schools with a mixed ethnic composition. The project has included a two-day training for selected novice teachers who teach Natural Science in subject teaching in Grade VI. The training was conducted in cooperation with the Bureau for Development of Education and covered topics related to: Classroom management; Creating a positive learning climate; Effective science teaching methods, including inquiry-based learning, hands-on experiments and project-based learning, all aligned with national and international standards. Following the training, the teachers implemented activities in the schools, whereas the peak of the activities were the four Science Fairs, which had a regional character, where the students from the different schools had the opportunity to get to know each other and present their completed projects to their peers from different schools.



Research methodology

For the purposes of project evaluation, two measurements of the experiences and attitudes of the teachers involved in the project were conducted using questionnaires designed by adapting questions from previous research (OECD TALIS 2018; Skaalvik & Skaalvik, 2007; Tschannen-Moran & Wolfolk Hoy, 2001). The first measurement (survey) was conducted before the beginning of the training and activities in January 2024. The second measurement (survey) was conducted after the completion of the project activities in May 2024. On both occasions, the questionnaires were distributed in electronic form in both Macedonian and Albanian languages for each question in parallel. The questionnaire used in the first survey contained the following sections/topics: Demographic questions; Teachers' feelings related to the choice of their profession; Limitations in the teaching of Natural Sciences; Teachers' beliefs about their competences for using modern methods and techniques in teaching Natural Sciences; Use of modern methods and techniques in teaching. The questionnaire in the second survey only used questions about: Teachers' beliefs about their competences for using modern methods and techniques in teaching Natural Sciences; Use of modern methods and techniques in teaching in order to enable comparability of results and to measure the impact of activities. The second survey also collected data on teachers' satisfaction with the project activities.

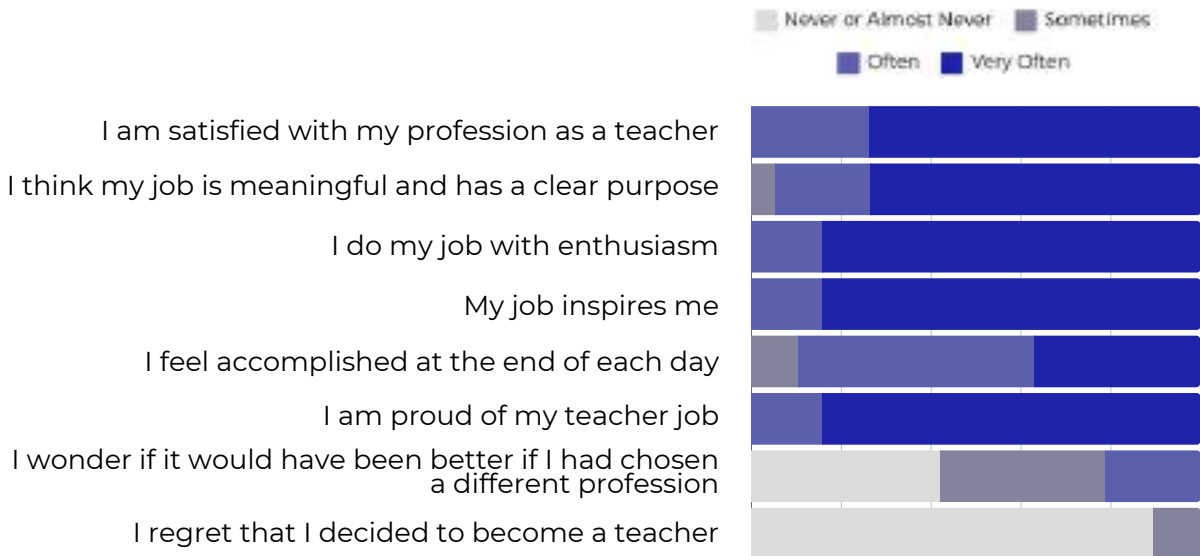
Results

Out of a total of 19 teachers, 15 evaluated that they were completely satisfied (score 5) with their participation in the project activities, in terms of the acquired knowledge, hands-on activities implemented, instructions received for preparing and implementing activities with the students, the manner in which the science fairs were organized, as well as the overall support they have received from the project team. Three teachers, all from schools in a rural area, evaluated their satisfaction from participating in the project with an average score of 3. This indicates the need for additional attention and support for those teachers who teach in rural areas in future activities.

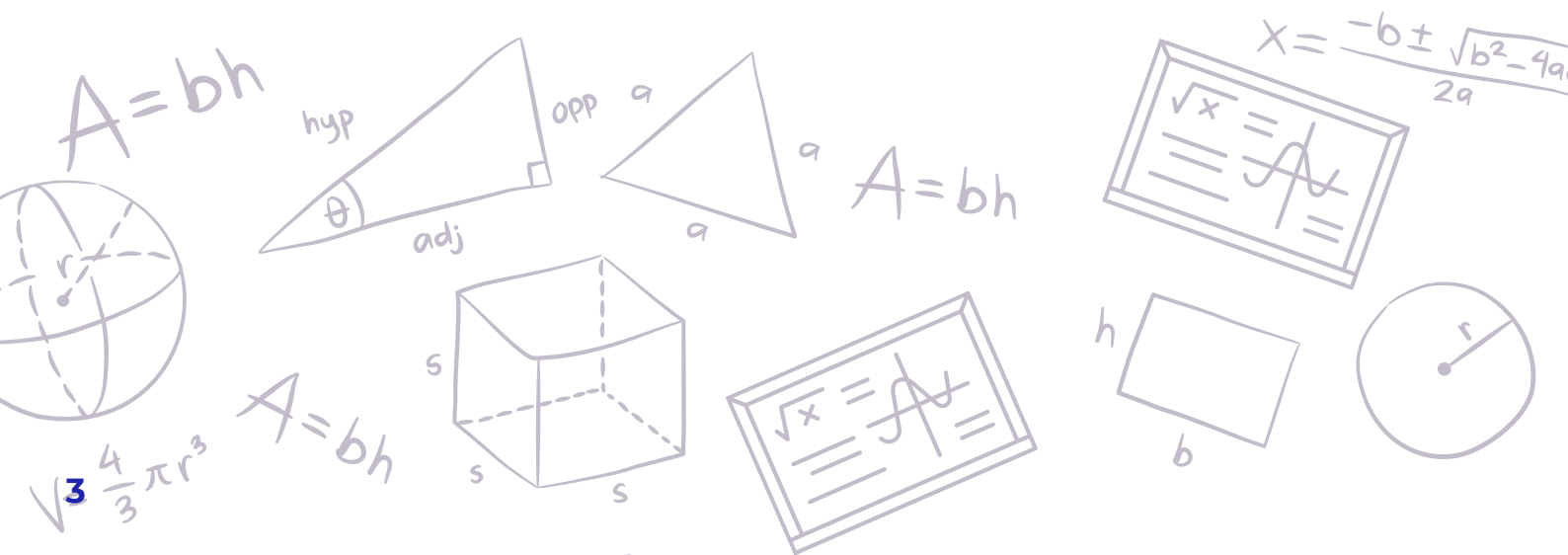
Teachers are also generally satisfied with their profession. They have a positive attitude towards their profession, that is, they often feel satisfied with their choice, they consider the teacher job to be meaningful, with a clear purpose and inspiring.



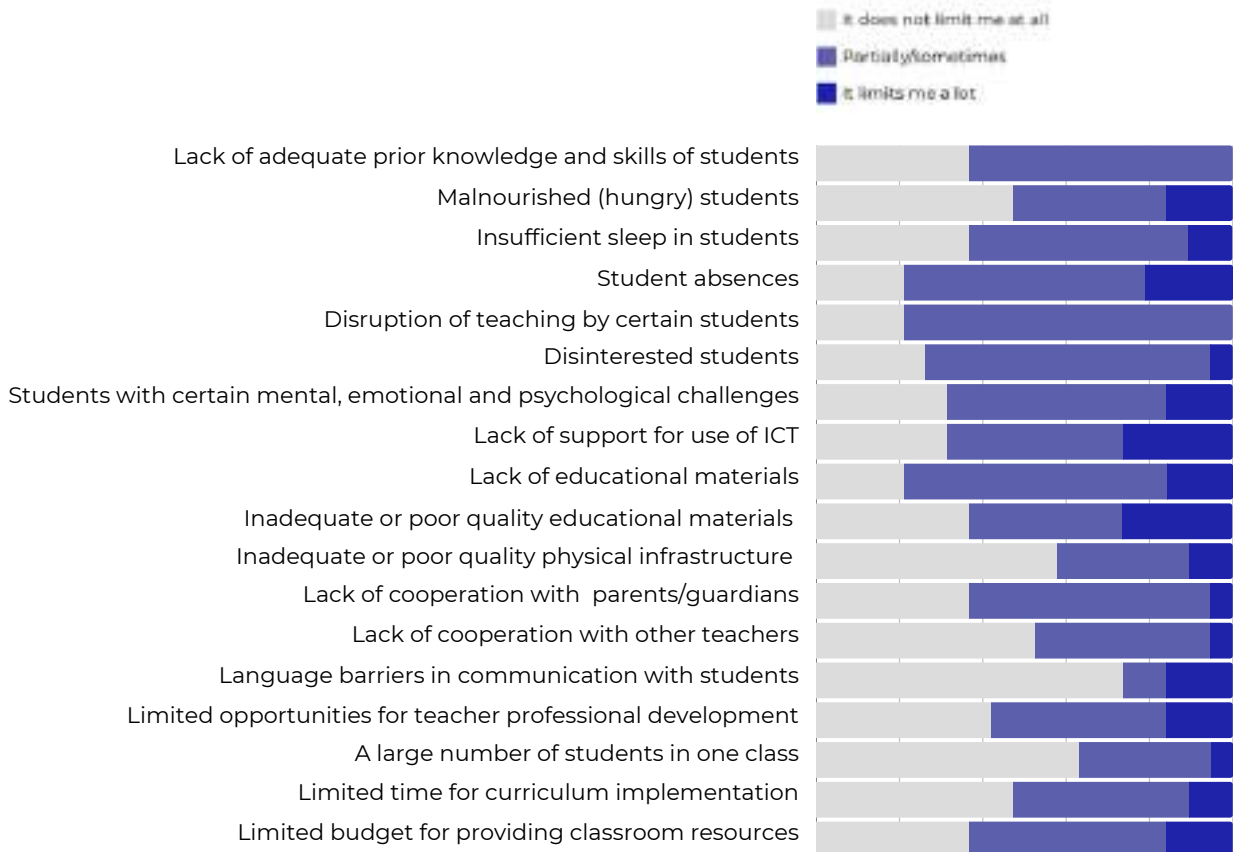
Teachers' attitudes towards the profession



According to the teachers, the factors that stand out for limiting the teaching of Natural Sciences are the following: inadequate or poor quality educational materials, lack of support for use of ICT and students' absenteeism greatly limit the teaching process. . On the other hand, lack of cooperation with other teachers and with parents/guardians, as well as a large number of students in one class, has been indicated as a limitation by only a small percentage of teachers. It is necessary to invest in quality materials that can be used in teaching and better support to teachers for use of ICT in teaching that will help in their better adapting to the needs of students who increasingly use different technological tools in their daily lives. Teachers should also receive better support and training to motivate students, which would reduce student absenteeism.



Factor that limit teaching implementation



Changes in teachers' assessments of the readiness to use modern approaches, methods and techniques in teaching Natural Sciences as a result of participation in the Project

The **"Science and Me"** project has shown significant positive changes in teaching practices of the participants. Teachers report a higher subjective assessment of their competencies to:

- ✓ Craft good/stimulating questions for students;
- ✓ Get students to do their best even when solving more difficult/complex problems;
- ✓ Help students think critically;
- ✓ Use a variety of assessment strategies;
- ✓ Incorporate real-world examples into lessons.



There is also an improvement in the self-assessment for the areas/activities that were marked as the most problematic before the project activities. Namely, teachers' assessment of their competences has improved in the following areas:

- Control disruptive behavior in the classroom;
- Assign tailored tasks to the weakest as well as to the best students;
- Teach well even if I am told to use predetermined instructional methods that would not be my choice;
- Manage instruction even if the curriculum is changed;
- Use hands-on activities and experiments in teaching Natural Sciences.

What should also be emphasized is that great positive changes have been noted in the very aspect of using experiments and hands-on activities in teaching, which is the aim of the project. Smaller changes have been noted in those teaching implementation aspects, which are not in the focus of the Project, such as, for example, maintaining discipline in the class and using digital technology.

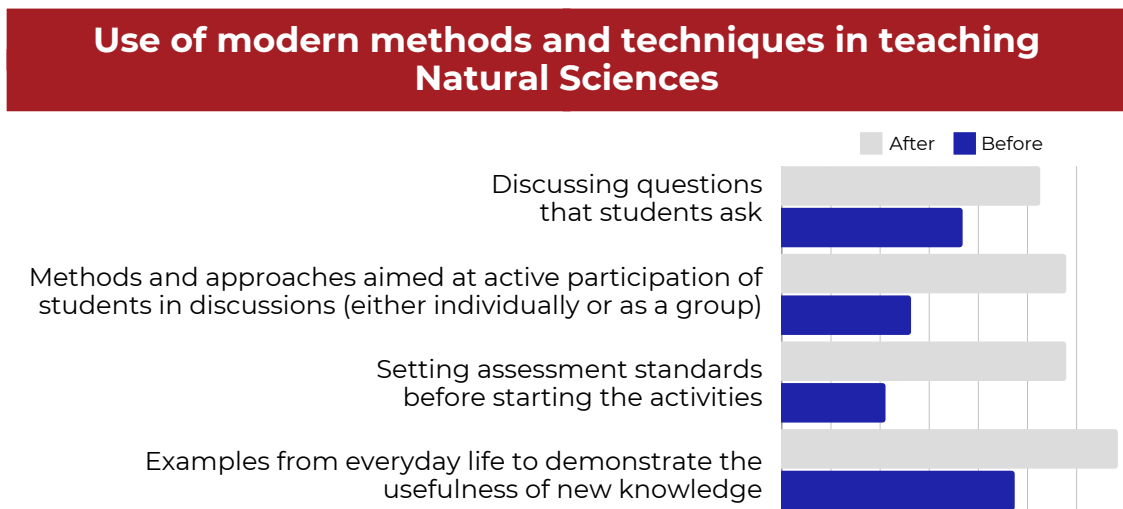
<i>Subjective assessments of the readiness to use modern approaches, methods and techniques in teaching Natural Sciences</i>	Not at all		To some extent		Quite a bit		A lot	
	before	after	before	after	before	after	before	after
Get students to believe that they can do well in schoolwork	/	/	5.3	/	52.6	15.8	42.1	84.2
Help students value learning	/	/	5.3	5.3	42.1	21.1	52.6	73.7
Craft good/stimulating questions for students	/	/	10.5	/	26.3	15.8	63.2	84.2
Get students to do their best even when solving more difficult/complex problems	/	/	10.5	5.3	52.6	15.8	36.8	78.9
Control disruptive behavior in the classroom	/	/	21.1	5.3	57.9	21.1	21.1	73.7
Motivate students who show low interest in learning	/	/	15.8	/	42.1	26.3	42.1	73.7
Make my expectations about student behavior clear	/	/	15.8	5.3	31.6	31.6	52.6	63.2
Help students think critically	/	/	10.5	5.3	31.6	10.5	57.9	84.2

Maintain discipline in any school class or group of students	/	/	21.1	5.3	31.6	42.1	47.4	52.6
Calm a student who is disruptive or noisy	/	/	15.8	15.8	36.8	31.6	47.4	52.6
Use a variety of assessment strategies	/	/	5.3	/	47.4	26.3	47.4	73.7
Provide an alternative explanation when students are confused	/	/	5.3	5.3	31.6	21.1	63.2	73.7
Implement different teaching strategies in my classroom	/	/	15.8	/	47.4	47.4	36.8	52.6
Manage instruction even if the curriculum is changed	/	/	21.1	15.8	42.1	36.8	36.8	47.4
Teach well even if you are told to use predetermined instructional methods that would not be your choice	/	/	21.1	5.3	47.4	42.1	31.6	52.6
Support student learning through the use of digital technology	/	/	10.5	15.8	57.9	47.4	31.6	36.8
Use hands-on activities and experiments in teaching	/	/	/	/	42.1	263	579	73.7
Plan/design experiments and hands-on activities	/	/	5.3	/	47.4	31.6	47.4	68.4
Assign tailored tasks to the weakest as well as to the best students	/	/	10.5	5.3	73.7	52.6	15.8	42.1
Facilitate discussion among students on how to interpret experimental findings	/	/	/	5.3	63.2	21.1	36.8	73.7
Explain subject matter so that that all students understand the basic principles	/	/	15.8	/	36.8	36.8	47.4	63.2
Get all students in the class to work hard with their schoolwork	/	/	10.5	5.3	63.2	36.8	26.3	57.9
Incorporate real-world examples into lessons	/	/	/	/	47.4	21.1	52.6	78.9
Provide constructive and timely feedback on the student work	/	/	5.3	/	52.6	36.8	42.1	63.2
Encourage creative and independent thinking of student	/	/	/	5.3	57.9	26.3	42.1	68.4
Utilize project-based learning approaches	/	/	5.3	/	42.1	42.1	52.6	57.9
Integrate cultural diversity into the curriculum	/	/	5.3	5.3	42.1	31.5	52.6	63.2
Foster a sense of community and teamwork in the classroom	/	/	/	/	36.8	36.8	63.2	63.2

As a result of the participation in the project activities, an increase in the frequency of using methods and activities aimed at more active engagement of students in the teaching process has been noted, such as:

- Discussing questions that students ask;
- Methods and approaches aimed at active participation of students in discussions (either individually or as a group);
- Examples from everyday life to demonstrate why new knowledge is useful;
- Setting assessment standards before the start of the activities.

These findings indicate that the project activities have had a positive impact on encouraging teachers to use more teaching methods that enable the active engagement of students in teaching. It is also notable that the reported frequency of using experiments and their reporting is lower in the second measurement. This may be partially due to the teachers' knowledge acquired during the project activities in terms of what extensive experiments in teaching actually mean and the knowledge that their practice does not incorporate many real experiments.



Conclusion



The project activities have been positively evaluated by the participants, which indicates that such activities need to continue in the future to support the teaching staff in providing adequate support to students in the learning process through the use of adequate teaching methods and techniques of classroom management and learning process. As the main findings we can highlight: positive changes in teaching practices and a higher subjective assessment of one's own competencies for using modern teaching methods and techniques; improving the support to students for their active engagement in the teaching process through methods and techniques that enable the direct application of scientific principles; a need for better equipping of schools, especially in rural areas, and greater support for using ICT in teaching; a need for the development of modern teaching materials; and a need for more lessons and opportunities for professional development since what is currently offered does not meet the needs of teachers.

Recommendations



To further improve the quality of teaching and support teachers and students in the educational process, it is necessary to have:

- ★ Continuous support and project expansion by inclusion of a larger number of schools and teachers, which will enable support for the teacher professional development and the use of modern teaching methods and techniques;
- ★ Investment in the physical infrastructure and equipment of schools, particularly in rural areas. This also means providing adequate visual materials as well as modern ICT equipment;
- ★ Creation and distribution of quality and accessible teaching materials that are aligned with modern educational standards to help teachers in implementing modern and effective teaching which will contribute to fostering more experiments in teaching Natural Sciences;
- ★ Fostering experiential learning and integrating examples from real life into teaching so that students can perceive the practical application of learned concepts and increase their interest in learning;
- ★ Provision of continuous opportunities for teacher professional development through workshops, seminars and other forms of training, aimed at improving teaching practices and methods, classroom management and use of ICT in teaching.



Highlights from the Regional Science Fairs



Highlights from the Regional Science Fairs



The project is implemented as part of the Johnson
Matthey Community Impact Program "Science and Me"



www.macedonia2025.com