

Analysis of the Turkish policy context

mathematics and science for life



mascil aims to promote a widespread implementation of inquiry-based teaching (IBL) in math and science in primary and secondary schools. It connects IBL in schools with the world of work making math and science more meaningful for young European students and motivating their interest in careers in science and technology.



1.11 National Report of Turkey

PART 1: A DESCRIPTIVE, EVIDENCE-BASED ACCOUNT OF THE NATIONAL CONTEXT

Introduction: Organization of education in Turkey

Grade	Age	Disciplines ¹	Type of school ²	Type of teachers ³	Initial training ⁴
Kinder garten	3-5	Nursery	General	Generalist G	4 years, University
1-4	6-9	Primary	Maths is a separate subject. Science is integrated in social sciences	Generalist G	4 years, University
5-8	10-13	Lower secondary	Maths and Science are separated subjects	mono-discipline specialists 1D	4 years, University
5-8	10-13	Lower secondary	Maths and Science are separated subjects	mono-discipline specialists 1D	4 years, University
9-12	14-17	Upper secondary	Maths, Biology, Physics and Chemistry are separated subjects	mono-discipline specialists 1D	5 years, University
9-12	14-17	Upper secondary	Maths, Biology, Physics and Chemistry are separated subjects	mono-discipline specialists 1D	5 years, University

1. Nursery, primary, upper-primary, lower secondary, upper secondary, vocational
2. Maths and sciences not separated (One), maths and integrated sciences (M & S) – 2 or 3 subjects in sciences (M & S2 or M & S3) or just one type of sciences Bio or Phys (M&Bio – M&Phys)
3. Generalist G, 2 disciplines specialists 2D, mono-discipline specialists 1D, nD, 2/1D...
4. Number of years in tertiary education of training (+n), type of institution (Uni, PHS – Pedagogical High School) Discipline (disc) or pedagogy (ped.) orientated, courses in Didactics (Dida)

Theme 1: State of affairs-recent changes

Wider policy perspectives

In Turkey, the science and maths curricula were changed very recently in 2013. They have just been implemented in Grade-5 and Grade-9. The most important feature of the new curricula are that they intend to promote the use of inquiry based education as well as alternative assessment strategies.

To date IBST is included in the curriculum framework of science and maths education to some extent. What this means in practice is not explicitly specified in the curricula. The curricula advises to use alternative assessment tools, and also formative assessment. But the teachers are under pressure because parents ask teachers to use other kinds of assessment tools that are more aligned with the exams the student will take. Therefore teachers prefer to use summative assessment rather than other assessment tools.

Science and mathematics teachers' education

Teachers for pre-primary and primary education hold a four-year bachelors degree. This applies for both, generalist teachers and specialist teachers. Generalist teachers usually teach grades 1-4, while subject/specialist teachers work in grades 5-8. Secondary education teachers hold a five-year master's degree. At this level, all the teachers are subject teachers. Both the primary teacher program and the secondary teacher program include some practical training within one year of study.

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Until now math and science teachers, who teach at lower- and upper secondary school, have graduated from a faculty of education; however, in 2013 faculty of education is not getting any students. In future, in order to be a teacher at lower or upper secondary school graduates from pure science and mathematics departments need to take part in some courses on pedagogy. That means after four or five years department of secondary school science and mathematics will be closed. This situation has created a big discussion among researchers, educators and policy makers.

The Department of In-Service Training under the Ministry of National Education is responsible for organizing training activities for teachers. In collaboration with other ministry departments every year the Department of In-service Training prepares an annual in-service training plan. The stated purpose of the in-service training is to help teachers to adapt to the new developments in science and technology, to increase their efficiency and to prepare them for higher-level job positions. In-service teacher training in Turkey is highly subject-oriented. The following subjects are covered in the in-service training: foreign language education; computer education; pedagogic formation education; education on preventing crime and violence in family, society, and educational environment; education for teachers' conformity to their environment and upper education programs [<http://www.meb.gov.tr/>]. In other words, mathematics and science does not seem to be represented here, but there are limited PD programmes in science and maths education..

Implementation in the classrooms

In Turkey, Turkish literature is the most prioritized subject, followed by mathematics and science. Inquiry or elements of inquiry are mentioned, to different degrees, in the primary and secondary science curriculum (physics, chemistry, and biology) in Turkey. Within classroom – and before introducing the new curricula – emphasis has been put on student centeredness, increased student activity, scientific literacy, and science process skills. Additionally the new science and maths curricula aim to track students' performance throughout the learning process, guide the students, probe their learning difficulties and try to remedy them and to provide continuous feedback for meaningful learning. The main approach for the assessment is to evaluate the process and the product. Traditional assessment tools would not be sufficient to assess the process; therefore, formative

assessment tools and strategies are suggested in the new science curriculum. In summary, the new science curriculum emphasizes the importance of both summative and formative assessment and offers guidelines to teachers on the use of these strategies in their classroom practice. (MEB, 2013, p. IV).

Constraints in relation to the aims of the mascil project

The most important feature of the new science and maths curricula is that they aim to explicitly promote the use of inquiry based education as well as the use of alternative assessment strategies. Therefore, the new curricula have similar aims than the mascil project has.

Policy references:

The new science and maths curricula (MEB, 2013):

<http://ttkb.meb.gov.tr/www/guncellenen-ogretim-programlari/icerik/151>

The curricula for vocational schools:

<http://ttkb.meb.gov.tr/www/haftalik-ders-cizelgeleri/kategori/7>

Theme 2: Schooling and the world of work

Wider policy perspectives

The connection between general education and the world of work are mainly mentioned in the national curriculum that emphasizes the necessity and importance of this connection. Vocational guidance is not a separate subject; rather it has an interdisciplinary character in other subjects. The targeted objectives of the science and math curricula are prepared based on the processes followed in producing scientific knowledge. One of the first priorities of the curricula is to develop students' science process skills. A scientific process is a process in which analytical and critical thinking skills are shaped. Science process skills are separated into two categories: basic skills and integrated process skills. Vocational education starts at Grade-5. Recently, the policy makers prioritize medical vocational high schools.

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Issues regarding schools/institutes

Vocational education starts at Grade-5 and continues until Grade-12. Science and maths exist as separate subjects. Types of vocational schools: Vocational school of theology (Grades 5-12), Industrial high schools (Grades 9-12), Trade vocational high school (Grades 9-12), Vocational high school of justice (Grades 9-12), Anatolian vocational high school (Grades 9-12), medical vocational high schools (Grades 9-12) etc.

The curriculum encourages schools visits to industrial sites but in practice it is hardly implemented.

The curriculum encourages making connections between vocational school system and providers of informal education (e.g. science camps, science museums and children universities). Students often visit industrial sites related to their subjects and need to spend some time during their schooling. The curriculum encourages making connections between vocational school system and providers of informal education (e.g. science camps, science museums and children universities)

There are not many connections between vocational school system and general schools.

Issues regarding classrooms

-In the curriculum links have been made between the contents and the context in the world of work.

-The new science and maths curricula promote the use of alternative assessment strategies and make connection between schooling and the world of work.

-In vocational schools, learning environments that keep students active and teachers as a guide (problem, project, collaboration based learning) form the basis for planning and application of courses? In relation to science and mathematics, an integrated approach is used.

-The students' assessment is mainly driven by national exams; therefore, the nature of students' assessment has commonalities between school level and nationwide.

Constraints in relation to the aims of MASCIL project

The connections among general education, vocational education and the world of work are not as strong as intended; therefore, the mascil project would stimulate the interactions among them.

Policy references

Vocational school curricula:

<http://ttkb.meb.gov.tr/www/haftalik-ders-cizelgeleri/kategori/7>

Theme 3: Science and Mathematics curricula and IBL

Wider policy perspectives

Inquiry or elements of inquiry are mentioned, to different degrees, in the primary and secondary maths and science curricula (physics, chemistry, and biology) in Turkey. IBL approaches are prioritized more in science and maths. In the curricula (MEB, 2013), skills related to inquiry are usually referred to as *science process skills*, or *problem solving skills* in the Turkish science and maths curricula. Examples of these competencies include critical thinking, independent thinking, problem solving, self-regulation, science process skills such as conducting observations, developing hypothesis, making inferences, testing hypothesis, psychomotor skills, collecting and analysing data, communicating findings, argumentation etc.

Issues regarding schools/institutes

Emphasis has been put on student centeredness, increased student activity, scientific literacy, and science process skills together with inquiry in the previous and new science and mathematics curricula. However, applying inquiry activities in the classroom is another issue. In many cases, changes in curricula have caused some changes in practice, but these changes have usually been superficial or on the surface. Because, after curriculum changed, teachers are offered very short periods of training, usually no more than a week, about the new curriculum. If the teachers are not prepared and

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supported in applying new strategies, they often are resistant to apply them. Teachers often have limited knowledge about how to mediate students' actions and how to design and implement inquiry activities. So, even though inquiry is mentioned in the Turkish science and mathematics curricula, the extent of its application in real practice is questionable.

Issues regarding classrooms

One of the shortcomings of the science and mathematics curricula is not having a teacher's guidebook. Teachers have not given enough resources how to implement the activities. Teachers are left alone or for some they give freedom to use their creativity while teaching science and mathematics. Although, the new curricula promote the use of inquiry based education and use of alternative assessment strategies, there is lack of assessment tools that draws on notions of inquiry based learning.

Constraints in relation to the aims of the mascil project

Since the new science and maths curricula promote the use of inquiry based education, teachers would be willing to learn more about IBST. This is an advantage for us to get teachers attention to the projects and disseminate the mascil. The framework and products of mascil can be useful for teachers, researchers and policy makers in Turkey.

Policy references:

The new science and maths curricula (MEB, 2013):

<http://ttkb.meb.gov.tr/www/guncellenen-ogretim-programlari/icerik/151>

The curricula for vocational schools:

<http://ttkb.meb.gov.tr/www/haftalik-ders-cizelgeleri/kategori/7>

Theme 4: Pre-Service teacher training in relation to i) IBL and ii) the world of work

Wider policy perspectives

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Prospective teachers' training aims to train teachers to have key concepts in maths and science as well as pedagogical content knowledge.

Implementation

The universities are responsible for pre-service teacher education in Turkey, but a national framework has been developed by the Council for Higher Educational in this area and consequently all the universities offering teacher education programs in Turkey will have the same courses and credit hours for the different levels.

Faculties of Education in Universities are responsible for pre-service teacher training in Turkey. As teacher educators we teach inquiry and inquiry methods in the science teaching methods courses. However, there is no national consensus on how to include inquiry in teacher education programs. So the emphasis put on inquiry in teacher education programs may considerably vary from university to university.

Access to university programmes depends on score in national entrance examination. Teachers for pre-primary and primary education hold a four year bachelors degree. This applies for both generalist teachers and specialist teachers. Generalist teachers or class teachers usually teach grades 1-4, while subject teachers work in grades 5-8. Secondary education teachers hold a five year master's degree. At this level, all the teachers are subject teachers. Both the primary teacher program and the secondary teacher program include some practical training within one year of study.

Faculties of Education in Universities are responsible for pre-service teacher training in Turkey. Access to university programmes depends on score in national entrance examination. Students who enrol science or mathematics education departments can become teachers. Until now maths and science teachers, who teach at lower- and upper secondary school, have graduated from a faculty of education; however, in 2013 faculty of education is not getting any students. In future, graduates from pure science and mathematics departments need to take some courses on pedagogy in order to be a teacher at lower or upper secondary school. That means after four or five years, department of secondary school science and mathematics will be closed down. This situation has created a big discussion among researchers, educators and policy makers. Both the primary teacher program and the secondary teacher program include some

practical training within one year of study. Pre-service teachers need to visit/practice at schools around 4-6 hours per week. The teacher education programs in the science and math fields include inquiry based science education, however, the extent and application varies.

Teachers' voice

Data will be collected after an ethical approve.

Constraints in relation to the aims of the mascil project

Teachers often have limited knowledge about how to mediate students' actions and how to design and implement inquiry activities. So, even though inquiry is mentioned in the curricula, the extent of its application in real practice is questionable. Therefore, MASCIL would offer best practices of IBST. The teacher education programs in the science and math fields include inquiry based science education, however, the extent and application varies.

- Policy references

Teacher Training:

http://www.yok.gov.tr/documents/10279/30217/yok_ogretmen_kitabi/054a8c72-174b-4b00-a675-837874006db5

Theme 5: In-Service teacher training in relation to i) IBL and ii)the world of work

Wider policy perspectives

There are professional development seminars after pre-service education. Teachers have to take TPD; seminars take place before the beginning and after the school semesters. That means they have two different TPD sessions. Apart from those there are some optional TPD sessions depending on teachers' need. In-service teacher training in Turkey is highly subject-oriented. The following subjects are covered in the in service training: foreign language education; computer education; pedagogic formation education; education on preventing crime and violence in family, society, and educational environment; education for teachers' conformity to their environment and upper education

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programs (<http://www.meb.gov.tr/>). In other words, mathematics and science does not seem to be represented here, but there are limited PD programmes in science and maths education. The nationwide training plan is mainly put into practice within two weeks during the summer holidays. A new teacher is guided by a mentor for about a year.

Implementation

Teachers have to take TPD; seminars take place before the beginning and after the school semesters. That means they have two different TPD sessions. Apart from those there are some optional TPD sessions depending on teachers' need. There are significant incentives for teachers to participate in TPD programmes.

The Ministry of National Education is mainly responsible for providing in-service teachers' training. However, the quality and effectiveness of the training modules have been criticised by researchers and teachers and also by the ministry staff. Therefore it is safe to say that in-service teacher education related to inquiry in science is very little or non-existent in most of the country. The Department of in-Service Training under the Ministry of National Education is responsible for organizing training activities for teachers. Every year the Department of in-service Training in collaboration with other ministry departments prepares an annual in-service training plan. This plan includes priorities and justification for the training, time, place, and date of the training period, training program, the teaching staff who will give the training and the personnel who will receive the training. The stated purpose of the in-service training is to help teachers and other ministry personnel to adapt to the new developments in science and technology, to increase their efficiency and to prepare them for higher-level job positions. In-service teacher training in Turkey is highly subject-oriented. The following subjects are covered in the in-service training: foreign language education; computer education; pedagogic formation education; education on preventing crime and violence in family, society, and educational environment; education for teachers' conformity to their environment and upper education programs. In other words, mathematics and science does not seem to be represented here, but there are limited PD programmes in science and maths education. The nationwide training plan is mainly put into practice within two weeks during the summer holidays.

- A new teacher was guided by a mentor for about a year.

- Professors from universities and mentors from the Ministry of Education are responsible for training in-service teachers.
- All teachers have to take TPD; seminars take place before the beginning and after the school semesters. That means they have two different TPD sessions. Apart from those there are some optional TPD sessions depending on teachers' need.
- The Department of in-Service Training under the Ministry of National Education is responsible for organizing training activities for teachers. Every year the Department of in-service Training in collaboration with other ministry departments prepares an annual in-service training plan. This plan includes priorities and justification for the training, time, place, and date of the training period, training program, the teaching staff who will give the training and the personnel who will receive the training. The stated purpose of the in-service training is to help teachers and other ministry personnel to adapt to the new developments in science and technology, to increase their efficiency and to prepare them for higher-level job positions. In-service teacher training in Turkey is highly subject-oriented. The following subjects are covered in the in-service training: foreign language education; computer education; pedagogic formation education; education on preventing crime and violence in family, society, and educational environment; education for teachers' conformity to their environment and upper education programs. In other words, mathematics and science does not seem to be represented here, but there are limited PD programmes in science and maths education. The nationwide training plan is mainly put into practice within two weeks during the summer holidays.
- Teaching methods vary a lot depending on the person who gives the training. In some cases, seminars are mainly used instead of interactive workshops. There is no national consensus on how to include inquiry in teacher education programs. So the emphasis put on inquiry in teacher education programs may considerably vary from university to university.

Teachers' voice

Data will be collected after an ethical approve.

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Constraints in relation to the aims of the mascil project

In Turkey, TPD programs are too short to make an impact; there are no long-term training programs. Moreover, most teachers do not value these programs enough to learn from them. Thus, Turkey needs more effective TPD programs, and especially for science and math teachers. It is stated by many researchers that there is a need to specify qualifications teachers should have and to train teachers based on these qualifications (there is already work going on this issue in Turkey). However, the current models for TPD in Turkey are based on a deficit model: Teachers are not good enough so we have to make them better. TPD may also be based more on the assumption that teachers are professionals who should be offered possibilities to improve. Due to short periods of training without any reflection afterwards, no evidence are reported on the effectiveness of these training. However, with a series of TPD sessions over a time period would be more effective. Therefore, such an approach used in MASCIL would be more beneficial.

Our faculty has agreement with more than 50 schools and agreement with a county of Ankara. We have been working with those teachers in other national projects and we are planning to work in different schools in Ankara. Some of our NAP members (e.g. Director of Foreign Relations, Small and Medium Enterprises Development Organization) have already agreed to help us to connect schools and world of work. Meting Bagdad, Director of Foreign Relations, Small and Medium Enterprises Development Organization.

Policy references:

www.hedb.meb.gov.tr

Esme, I. (2009) Öğretmen Yetiştirmede Geri Adımlar. Available at: <http://yunus.hacettepe.edu.tr/~cakmakci/esme.pdf>

PART 2: EMERGING ISSUES FOR REFLECTION

Equity specific issues

In the PISA 2006 assessment of scientific literacy 15-year-old students in Turkey reached a competency value of 424 points and thus performed well below the OECD average of 500 points on the PISA scale (OECD, 2007; 2008). Of the 30 OECD countries only Mexico

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ranked below Turkey. The variance in the competency distribution in Turkey was quite small. Nearly half of the students were located below proficiency level 2 (OECD average 19.2%) which is defined as the achievement level at which students begin to demonstrate the science competencies that will enable them to participate actively in life situations related to science and technology. Furthermore, the amount of high achieving students (at proficiency levels 5 and 6) in Turkey is very small (0.9% compared to an OECD average of 9%). Turkey and Greece are the only two OECD countries in which girl's outperformed boys significantly in science performance.

The policy documents and the curricula states that gender inequalities should be tackled, but this is not explicitly specified how to do that. TPD programmes in Turkey are highly subject-oriented. Gender specific issues and using different learning styles for different genders and needs (e.g. low achievers) are mentioned in the following PD programmes. The following subjects are covered in the in-service training: foreign language education; computer education; pedagogic formation education; education on preventing crime and violence in family, society, and educational environment; education for teachers' conformity to their environment and upper education programs [<http://www.meb.gov.tr/>]. In other words, mathematics and science does not seem to be represented here, but there are limited PD programmes in science and maths education.

Addressing low achievement

Students from disadvantaged background and low-income cities performed low performance. (<http://www.osym.gov.tr>). The policy documents and the curricula states that low achievement issues should be addressed during teaching, but this is not explicitly specified how to do that. TPD programmes aims to address issues on how to tackle low achievement. Gender specific issues and using different learning styles including IBL approaches for different for low to high achievers are mentioned in the following PD programmes. The ideas are integrated into the subjects. The following subjects are covered in the in-service training: foreign language education; computer education; pedagogic formation education; education on preventing crime and violence in family, society, and educational environment; education for teachers' conformity to their environment and upper education programs [<http://www.meb.gov.tr/>]. In other words, mathematics and science does not seem to be represented here, but there are limited PD programmes in science and maths education.

Promoting entrepreneurship

Entrepreneurship education is a priority in Turkey. A subject called “Entrepreneurship” has been implemented in lower secondary level since 2009. The Scientific and Technological Research Council of Turkey (TUBITAK) is the leading agency for managing, funding, and conducting research in Turkey. The council was established in 1963 with the mission to advance science and technology, conduct research, and support Turkish researchers, teachers and students. TUBITAK has been working closely together with scientists and other research institutions in Turkey and abroad to develop strategies that will improve public’s entrepreneurship and innovation capabilities. TUBITAK is also responsible for promoting and carrying out cutting-edge scientific research, and making the findings available to the public.

The Scientific and Technological Research Council of Turkey (TUBITAK) encourages and funding any initiative activities related to entrepreneurship and innovation education. Recently, TUBITAK has funded projects that target teacher education on entrepreneurship and innovation education.

Comments by the NAB

Feedback about the document will be given at the coming NAB meeting.

1.12 National report of Lithuania

PART 1: A DESCRIPTIVE, EVIDENCE-BASED ACCOUNT OF THE NATIONAL CONTEXT

Introduction: Organization of education in Lithuania

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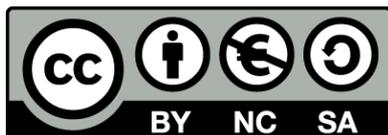
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