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THE STUDY PLAN

Roadmap to develop your Study Plan

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GUIDELINES
HOW TO JOIN/DEVELOP THE STUDY PLAN

Is your school interested in joining or developing the Study Plan ?
the first step is to appoint a COORDINATOR to liaise with the partner schools and manage the work.
The process should begin with the appointment of a COORDINATOR to liaise with the partner school(s) and organise the work inside the school.
The school should take the following steps:

1

FAMILIARISE WITH THE STUDYPLAN

The first steps consists on reading the document "the STUDY PLAN" and starting with the identification of the potential working group among the teachers of your school.

2

ORGANISE AN INTERNAL MEETING

Organise an internal meeting to present and share the document The Study Plan Model with the colleagues you interested and that could be involved.

3

IDENTIFY THE SUBJECTS

Along with your colleagues identify all the subjects that might be included in the Study Plan and create the working group with the teachers.

4

COLLECT THE CURRICULA

For each subject identified, collect the national curriculum and the learning objectives. You will share these documents with the partner school.

5

DESCRIBE YOUR SCHOOL

Prepare a description of your school to share with the partner school. Highlight the general context of your school (Type of school, educational profile, number of pupils and staff, profile of students, location)

6

DESCRIBE THE EDUCATION SYSTEM

Prepare a description of your national education system explaining how it is organised and how it work. The key features can be found on the Eurydice website (www.eurydice.eacea.ec.europa.eu).

7

ORGANISE A MEETING

You are now ready to meet the partner school. Organise a first meeting with the partner school to get to know each other and kick-off the joint work. The meeting will be an opportunity to exchange the school and education system description and to decide together which subjects can be included in the Study Plan.

8

GROUP WORK

It is time to start developing the common curriculum. Organise a second meeting with the partner school, where teachers, divided by subject, should conduct a comparative analysis of national curricula to identify common elements, learning objectives, topics and skills to be acquired.

SEE THE ANNEX 1

9

FEEDBACK

Collect feedback and any problems encountered in the process from participating teachers.

10

MEETING

Organise a third meeting with the partner school. This is the time for teachers to develop teaching modules for each subject to be taught during the mobility .

SEE THE ANNEX 2

FAMILIARISE WITH THE STUDYPLAN

The first step consist in reading the document "the STUDY PLAN" and starting with the identification of the potential working group among the teachers of your school.

The document is composed of 4 different sections:

- the European Framework,
- the national education systems,
- the participating schools
- and finally the core of the document: the subjects included in the study plan.

For a general overview of the entire process, you can also consult the:

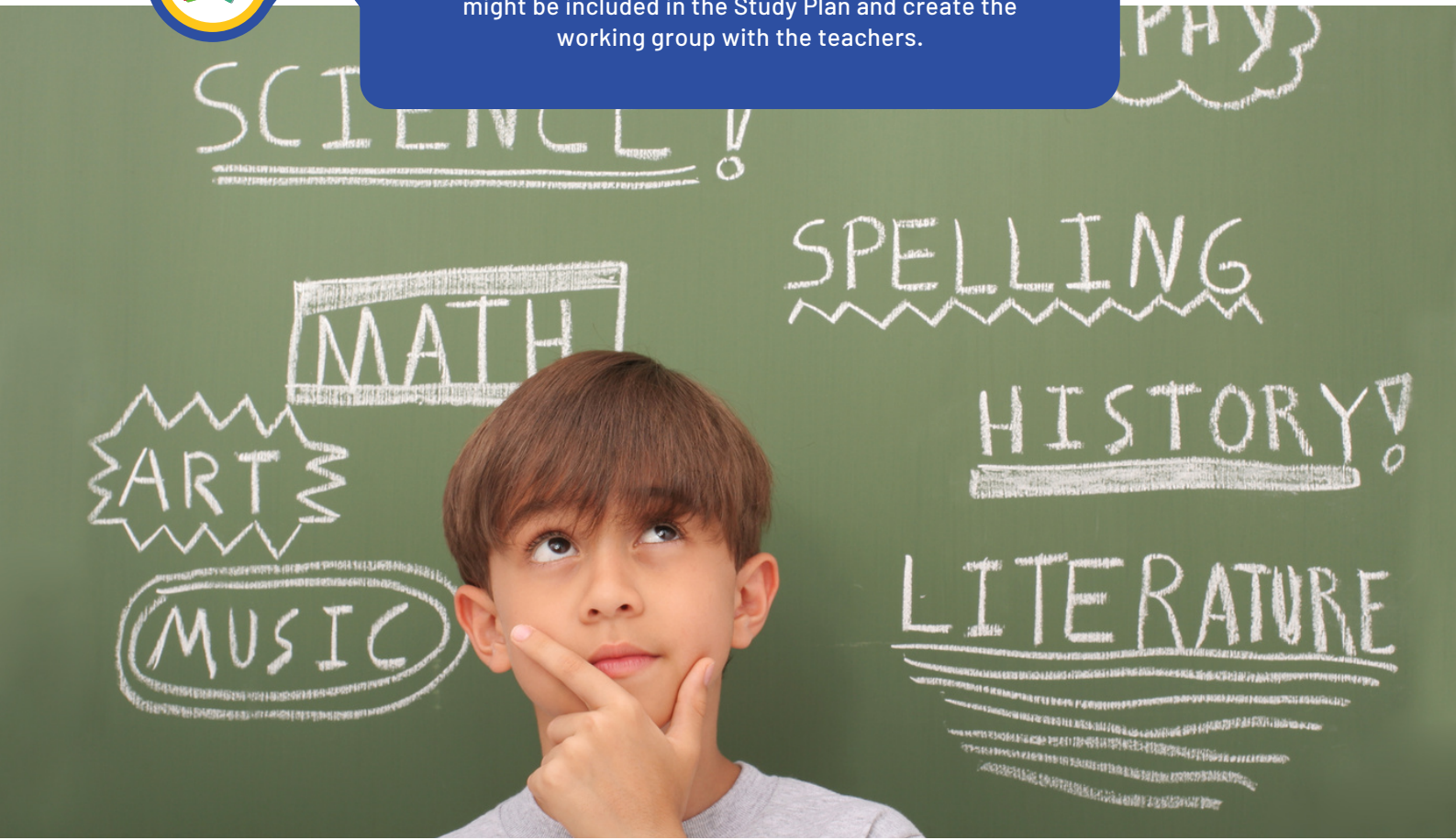
1. Set of Assessment Tools (IO2)
2. Administrative and Organisational Package - AOP (IO3)
3. and the Online Training Course for school staff (IO4)

ORGANISE AN INTERNAL MEETING

Organise an internal meeting to present and share the document The Study Plan Model with the colleagues you interested and that could be involved.

IDENTIFY THE SUBJECTS

Along with your colleagues identify all the subjects that might be included in the Study Plan and create the working group with the teachers.



COLLECT THE CURRICULA

For each subject identified, collect the national curriculum and the learning objectives. You will share these documents with the partner school.

MATHEMATICS

Swedish National Curriculum - Folkungaskolan

Mathematics has a history stretching back many thousands of years with contributions from many cultures. It has developed not only out of practical necessity, but also as a result of people's curiosity and desire to explore mathematics as an end in itself. Communication using the language of mathematics is similar all over the world. As information technology develops mathematics is being used in increasingly complex situations. Mathematics is also a tool in science and different professions. Ultimately mathematics is about discovering patterns and formulating general relationships.

Aim of the subject. Teaching in mathematics should aim at students developing their ability to work mathematically. This involves developing an understanding of mathematical concepts and methods, as well as different strategies for solving mathematical problems and using mathematics in social and professional situations. Teaching should give students the opportunity to challenge, deepen and broaden their creativity and mathematical skills. In addition, it should contribute to students developing the ability to apply mathematics in different contexts, and understand its importance for the individual and society. Teaching should cover a variety of working forms and methods of working, where investigative activities form a part. Where appropriate, teaching should take place in environments that are relevant and closely related to praxis. Teaching should give students the opportunity to communicate using different forms of expression. In addition, it should provide students with challenges, as well as experience in the logic, generalisability, creative qualities and multifaceted nature of mathematics. Teaching should strengthen students' confidence in their ability to use mathematics in different contexts, and provide scope for problem solving both as a goal and an instrument. Teaching should also give students the opportunity to develop their ability to use digital technology, digital media, and other tools which can occur in subjects typical of programmes.

Teaching in mathematics should give students the opportunity to develop their ability to:

1. use and describe the meaning of mathematical concepts and their inter-relationships.
2. manage procedures and solve tasks of a standard nature with and without tools.
3. formulate, analyse and solve mathematical problems, and assess selected strategies, methods and results.
4. interpret a realistic situation and design a mathematical model, as well as use and assess a model's properties and limitations.
5. follow, apply and assess mathematical reasoning.
6. communicate mathematical thinking orally, in writing, and in action.
7. relate mathematics to its importance and use in other subjects, in a professional, social and historical context.

Main learning objectives and requirements for each of the three years.

Core content. Teaching in the course should cover the following core content: understanding of numbers, arithmetic and algebra; methods of calculating using real numbers in different forms in daily life and in subjects typical of a programme, including rough approximation, mental arithmetic and estimation, as well as strategies for using digital tools; strategies for using tools from subjects typical of a programme, such as forms, templates, rules of thumb, regulations, manuals and handbooks; handling algebraic expressions and formulae relevant in subjects typical of a programme, as well as methods for solving linear equations; geometry Properties and representations of geometric objects, such as drawings, practical designs, and coordinate systems; geometric concepts chosen with regard to the needs of subjects typical of a programme, such as scale, vectors, uniformity, congruence, sine, cosine, tangent and symmetries; methods of measuring and calculating quantities that are crucial in subjects typical of programmes; units, unit conversions and processing of numerical values which are crucial in subjects typical of programmes, and rounding off methods relevant to subjects typical of programmes; relationships and change; advanced percentage concepts: per mille, ppm and percentage points; the concepts of rate of change and index, as well as methods for calculating interest and amortisation for different types of loan, the concepts of ratio and proportionality in reasoning, calculations, measurements and designs; differences between linear and exponential processes; probability and statistics; descriptive statistics using spreadsheets, and examination of how statistical methods and results are used in society and professional life; the concepts of dependent and independent events, as well as methods for calculating probabilities in multi-stage random trials, using examples from games, and risk and safety assessments; problem solving; strategies for mathematical problem solving including the use of digital media and tools; how mathematics can be used as a tool in dealing with wide-ranging problem situations in subjects typical of a programme; the opportunities and limitations of mathematics in these situations; mathematical problems relevant to personal finances, societal life and applications in other subjects; mathematical problems related to the cultural history of mathematics.

THEN, YOU WILL EXCHANGE THE CURRICULA WITH THE PARTNER SCHOOL

Italian National Curriculum - Scuola Italiana Madrid

Two previous year:

1. First and second degree algebra: equations, systems and inequalities.
2. Algebra of irrational equations and inequalities
3. Analytical geometry, straight lines, conics, graphic resolutions of equations, inequalities and systems, geometric places, geometric transformations
4. Exponentials and logarithms
5. Goniometry and trigonometry
6. Probability and statistical sampling

Graduation Year:

1. Mathematical Analysis. Limits, Derivatives, Function Studies
2. Optimal problems applied to geometry, physics, practical problems
3. Integral Calculus. Indefinite, definite integrals, calculation of areas, surfaces, volumes, application to physics and sciences
4. Geometry of space
5. Probability distributions
6. Differential equations

Main learning objectives and requirements for each of the three years

Graduation Year:

TRANSVERSAL OBJECTIVES

1. to enhance the decision-making capacity in the face of possible different paths in dealing with a situation through the a posteriori and a priori critical evaluation of the different solution paths of the same problem
2. to accustom the pupil to study each issue through the analytical examination of its factors, addressing complex problems that can be traced back to the solution of several subproblems
3. to enhance the ability to critically review and logically arrange what is learned by evaluating the reliability of the results obtained, their consistency and the possibility of inferring generalizations from specific results
4. to deal with complex reasoning procedures, which require the ability to process and manage intermediate results subsequently used in the general context of the activity carried out by addressing complex problems related to the solution of multiple sub-problems
5. to develop an interdisciplinary conception of learning and culture oriented towards overcoming the humanistic-scientific dualism and a specialized conception of scientific knowledge by offering food for thought on the logical foundations of mathematics, the concept of infinity, of the concept of "beauty" in mathematics; through the offer of biographical notes of the major mathematicians who will be met.

Penultimate and third last year:

TRANSVERSAL OBJECTIVES

1. to enhance logical skills through the use of specific troubleshooting procedures
2. to learn to rework known schemes from different points of view, managing to identify in this an enrichment of one's abstraction capacity through the revision of Euclidean geometry theorems and the use of algebraic calculation procedures in the context of analytical geometry
3. to enhance the ability to critically review and logically arrange what is learned by evaluating the reliability of the results obtained, their consistency and the ability to deduce generalizations from specific results
4. to enhance the decision-making capacity in the face of possible different paths in dealing with a situation through the a posteriori and a priori critical evaluation of the different solutions for the same problem
5. to knowing how to grasp the possibility of interrelationship and interdependence of the knowledge acquired in different disciplines through the application of mathematical tools that one has to solve problems of various kinds

Italian National Curriculum - Liceo Moro

THIRD CLASS

- equations and inequalities (second degree and higher)
- irrational equations and inequalities
- successions and progressions
- equations and inequalities with absolute value
- analytic geometry in the plane: the line, the parable, the circumference, the ellipse, the hyperbola
- functions and their properties
- exponential functions
- logarithm functions

FOURTH CLASS

- goniometric functions,
- goniometric equation and goniometric inequalities
- trigonometry
- geometric transformations
- combinatorics and probability
- euclidean geometry in space
- analytic geometry in space

Main learning objectives and requirements for each of the three years

For 3rd and 4th grades, students are gradually trained to:

- Use techniques and procedures of algebraic calculation, representing them under graphic form.
- Identify appropriate strategies for solving problems.
- Build models of growth or decrease, exponential and logarithmic.
- Build and analyze models of periodic trends in the description of physical phenomena or events of other kind.

DESCRIBE YOUR SCHOOL

Prepare a description of your school to share with the partner school. Highlight the general context of your school (Type of school, educational profile, number of pupils and staff, profile of students, location)

EXAMPLE

Folkungaskolan

2+2=5

Linköping - Sweden

Folkunga is an upper secondary high school in Linkoping, Sweden. The school was built in 1914. The school has educated pupils for over 100 years. The school has about 1500 pupils. Around 720 attend the compulsory school (age 10-16). The upper secondary school holds 780 students (age 16-19). Staff employed around 170. The school is situated in the city of Linkoping which has around 160000 residents. Linköping has a university which harbours around 23000 students.

Folkungaskolan aims to prepare its upper secondary students for university studies or other studies at a higher level. The students study courses such as Maths, Science, Languages, Business, Law, Civics, English, History, Swedish, Swedish as a Second Language, Psychology, Religion and Physical Education as a base.

Students can add 3-4 courses apart from the basic range of courses like Criminology or Leadership etc.

The time spent at Folkunga is valuable, it is about our students' future. Our aim is to give the best possible education when attending Folkungaskolan. Knowledge will open many boundaries, break walls and create new options. In order to achieve all this, we have teachers who work effortlessly in order to enhance our students' development and give them tools so they can analyse and ask the right questions from a scientific basis.

DESCRIBE THE EDUCATION SYSTEM

Prepare a description of your national education system explaining how it is organised and how it works. The key features can be found on the Eurydice website (www.eurydice.eacea.ec.europa.eu).

KEY FEATURES OF THE SWEDISH EDUCATION SYSTEM

Sweden has a decentralised education system, steered by goals and learning outcomes defined at central level. The government has the overall responsibility and sets the framework for education at all levels.
Municipalities (kommuner) in Sweden are responsible for organising education within:

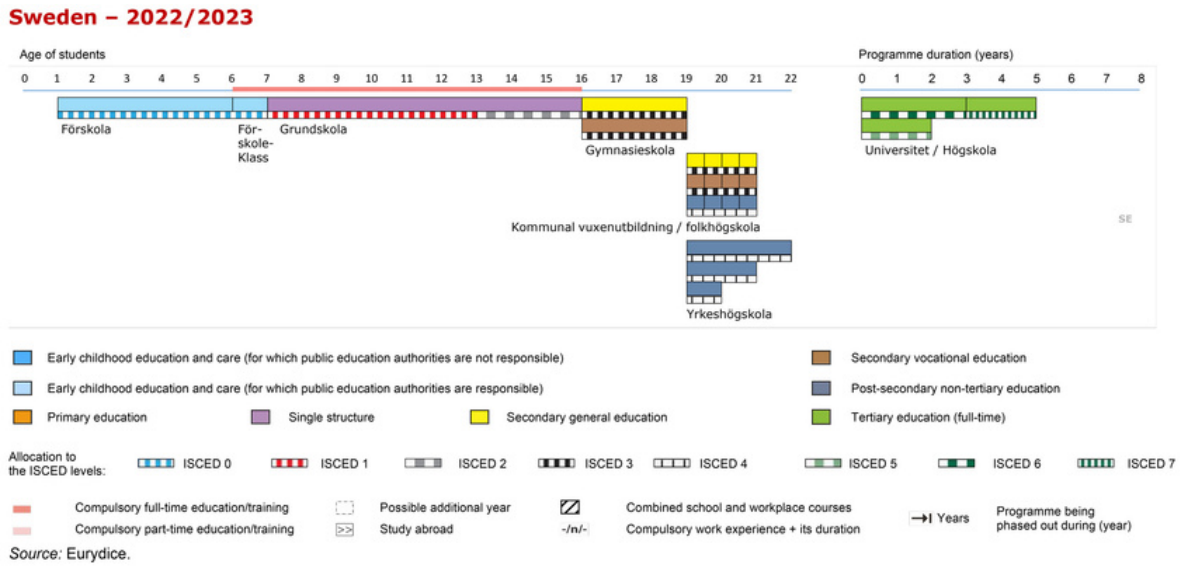
- preschool (förskola)
- preschool class (förskoleklass)
- compulsory school (grundskola)
- upper secondary school (gymnasieskola)
- municipal adult education (kommunal vuxenutbildning, Komvux)
- Swedish tuition for immigrants (svenskaundervisning för invandrare, sfi)
- leisure-time centres (fritidshem)

The major part of school funding on those levels, including grant-aided independent schools (fristående skolor), comes from municipal tax revenues. Grant-aided independent schools are open to all and follow the same curricula as municipal schools do.

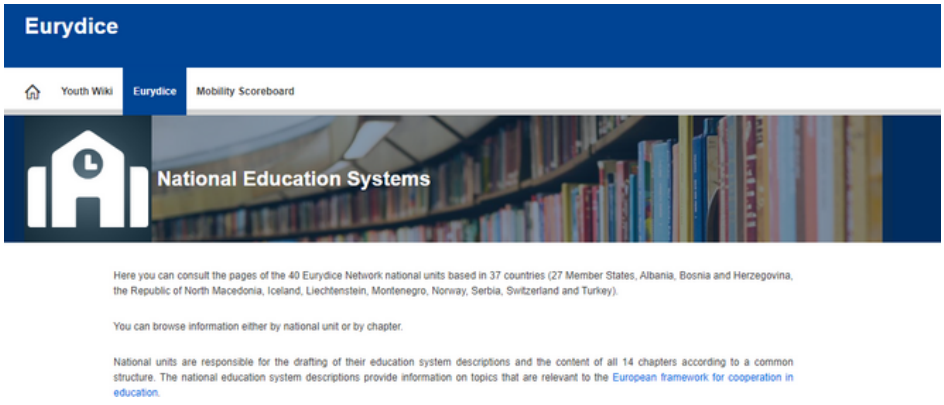
The national school system is governed by the Education Act (Skollag, 2010:800), decided by the Parliament (riksdagen). The Education Act contains general regulations for all types of schools. The national curriculum, adopted by the government, sets out the tasks and overall objectives of upper secondary education, as well as the values that form the basis of teaching. The parliament decides on the upper secondary programmes and which subjects that are to be common core subjects. The government sets out the programme goals, specifying the purpose and objectives of each national programme. The National Agency for Education (Skolverket) adopts syllabi. The syllabi sets out the goals of teaching for each individual subject and course.

The compulsory school system comprises compulsory school (grundskolan), the Sami school (sameskolan) for Sami-speaking children who live in the north of the country, schools for pupils with impaired hearing (specialskolan), and education for pupils with learning disabilities (grundsärskolan).
Municipalities are obliged to arrange preschool classes (förskoleklass) for all children six years of age. Participation in the preschool class is mandatory.
Under the Education Act, nine years of compulsory schooling is obligatory for all children aged 7 to 16, i.e. school attendance is compulsory. The Education Act also states that children and young people have a right to receive education in the national school system.

Stages:



Source: Eurydice.



ORGANISE A MEETING

You are now ready to meet the partner school. Organise a first meeting with the partner school to get to know each other and kick-off the joint work. The meeting will be an opportunity to exchange the school and education system descriptions and to decide together which subjects can be included in the Study Plan.

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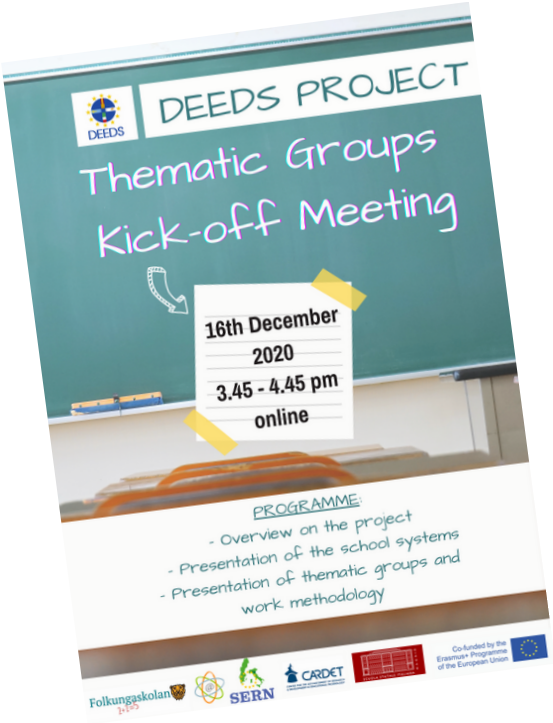

GROUP WORK

It is time to start developing the common curriculum. Organise a second meeting with the partner school, where teachers, divided by subject, should conduct a comparative analysis of national curricula to identify common elements, learning objectives, topics and skills to be acquired.

EXAMPLE

Use the Annex1!

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ANNEX 1

Comparative analysis of curricula

The thematic group should conduct a comparative analysis of curricula in order to develop a joint study programmes. The comparative analysis should result in a document divided in three sections.

Section 1
Comparative analysis of curricula and identification of common elements

Section 2
Comparative analysis of learning objectives and identification of possible common elements.

Section 3
The groups should identify and choose a set common topics/on the basis of the learning objectives identified in the previous section.

COMPARATIVE ANALYSIS OF CURRICULA AND IDENTIFICATION OF COMMON ELEMENTS.

The school systems are quite different from each other and so are the curricula and it is difficult to identify common elements, especially for a long term period.

Folkungaskolan. In Sweden not all students are studying Math all the years through the gymnasium (most students only study math for 2 years and take course 1 and 2) and they get one grade for each course they take. The students usually have 3 hours of math every week. In the Swedish curricula it says that teaching in mathematics should aim at students developing their ability to work mathematically, by:

- developing an understanding of mathematical concepts and methods
- developing different strategies for solving mathematical problems
- using mathematics in social and professional situations.

Teaching should give students the opportunity to challenge, deepen and broaden their creativity and mathematical skills. In addition, it should contribute to students developing the ability to apply mathematics in different contexts, and understand its importance for the individual and society. Teaching should cover a variety of working forms and methods of working, where investigative activities form a part. Where appropriate, teaching should take place in environments that are relevant and closely related to praxis. Teaching should give students the opportunity to communicate using different forms of expression. In addition, it should provide students with challenges, as well as experience in the logic, generalisability, creative qualities and multifaceted nature of mathematics. Teaching should strengthen students' confidence in their ability to use mathematics in different contexts, and provide scope for problem solving both as a goal and an instrument. Teaching should also give students the opportunity to develop their ability to use digital technology, digital media, and other tools which can occur in subjects typical of programmes. Depending on what course (year at school) there are different core content to work with the aim of the subject.

Summary of curricular content by course/year:

First year/MA1b: First degree algebra and equations/inequalities, first degree analytic geometry, radicals, probabilities, function studies, problem solving;

Second year/MA2b: Second degree algebra, exponentials and logarithms, statistics, elements of logic, euclidean geometry, problem solving;

Third year/MA3b (not all students): Mathematical analysis (limits, derivatives), function studies, optimal problems (practical problems), integral calculus (indefinite, definite integrals, calculation of areas), problem solving.

Scuola Italiana Madrid. Students of the Liceo Italiano in Madrid study mathematics during all four years of the course (5 hours per week in the first, second and fourth year, three in the third year). Mathematics lessons are generally taught by the same teacher who holds the Physics lessons.

Summary of curricular content by year:

First year: Euclidean geometry, numerical sets, elements of logic, first degree algebra, first degree analytic geometry.

Second year: radicals, second degree algebra, probability and statistics; second degree analytical geometry.

Third year: second degree analytical geometry, trigonometry, exponentials and logarithms; probability and statistics.

Fourth year: mathematical analysis; integrals, differential equations, solid Geometry.

Liceo Moro. In our Liceo we have two different programs: Liceo linguistico that is more focused on learning foreign languages (they only study math 3 our per week the first two year and 2 hour per week the third, fourth and fifth year) ad the Liceo Scientifico, more focused on science in general (they study math 5 hours per week the first two years and than 4 hours per week). In the two programs the contents that are taught are more or less the same, but with a different approach: in the Liceo Scientifico every content is studied in depth. A big difference between the Italian school and the other schools in Europe, is that we have five years of high school: students finish their course at the age of 19 and then go to university a year later than the other students in Europe. That is the reason why an exchange could be more difficult the last year of school.

Summary of curricular content by year:
First year: Euclidean geometry, numerical sets, elements of logic, first degree algebra, first degree analytic geometry (Cartesian plane and straight line).
Second year: radicals, second degree algebra; probability and statistics; Euclidean geometry with demonstration.
Third year: second degree analytical geometry, exponentials and logarithms.
Fourth year: goniometric functions, trigonometry,combinatorics and probability, transformations in the plan, complex numbers, solid Geometry.
Fifth year: Analysis, function study; limits, derivatives and integrals, probability distribution, differential equations

For a long term period we could involve the first and second classes of Liceo scientifico in Italy and Madrid (14 and 15 years old) and maybe the first class at Folkungaskolan in Sweden (16-17 years old) . The common topics could be: elements of algebra; elements of geometry ; probability and statistics.
We find more common elements for the older students (16 -18) between: Liceo Scientifico in Italy and Liceo of Madrid (for example different types of inequalities, analytic geometry, elements of analysis) and Liceo linguistico in Italy and Folkungaskolan in Sweden (for example algebra, equations and inequalities, exponentials and logarithms, analytic geometry)

COMPARATIVE ANALYSIS OF LEARNING OBJECTIVES AND IDENTIFICATION OF COMMON ELEMENTS.

Mathematical concepts and procedures
Folkungaskolan. Goal: To use and describe meaning of concepts and to manage procedures and solve tasks of a standard nature with and without tools.
Scuola Italiana Madrid. Goal: first year - getting used to using new languages both through the acquisition of formalism and through the use of IT supports; first and second year - consolidate the ability to calculate and use the tools of algebra; First second and third year - Knowing how to use the tools of analytical geometry: in particular, knowing how to deal with first and second degree geometric places, acquiring the ability to relate the algebraic properties of the equations of place with the geometric properties of the places studied
Liceo Moro. Goal: to understand the concept deeply and be able to apply the mathematical instruments learned to solve different kinds of problems. Learn to use specific language, understanding the power of mathematical language.

Problem solving and modeling
Folkungaskolan. Goal: To formulate, analyse and solve mathematical problems, and assess selected strategies, methods and results. To interpret a realistic situation and design a mathematical model, as well as use and assess a model's properties and limitations.
Scuola Italiana Madrid. Goal: First year - knowing how to identify the possible of interrelation and interdependence of the knowledge acquired in different disciplines through the application of the mathematical tools you have to solve problems of various kinds. Second year - knowing how to develop the ability to analyze problems with a mathematical content through the search for an effective solution strategy. Third and fourth years - enhance the ability to critically review and logically arrange what is learned by evaluating the reliability of the results obtained, their consistency and the possibility of deducing generalizations from specific results.
Liceo Moro. Goal: the students should develop strategy to analyze data, and find a way to solve a problem, in different field, using the mathematical instrument learned during the high school.

FEEDBACK

Collect feedback and any problems encountered in the process from participating teachers.

MEETING

Organise a third meeting with the partner school. This is the time for teachers to develop teaching modules for each subject to be taught during the mobility .

EXAMPLE

Use the Annex2!

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ANNEX 2

Development of teaching modules

TITLE OF THE MODULE:
YEAR:
TEACHING HOURS:

DESCRIPTION

LEARNING OBJECTIVES

MATERIALS

PROPOSED TOPICS/CONTENTS.

Ten modules to be implemented have been identified.

MODULE 1: FIRST DEGREE ALGEBRA, EQUATIONS, AND INEQUALITIES

(S year 1 E year 1 After Function Module). Teaching hours: 10-15

Description

- first degree algebra and the basic laws of algebra (the commutative law for addition, commutative law for multiplication, associative for addition, associative for multiplication, distributive law and zero laws);
- concept of first degree equation (linear equation) and different solving techniques;
- concept of linear inequalities and different solving techniques.

Learning Objectives

- handling of formulas and algebraic expressions, including factorizing and multiplying;
- expression;
- algebraic and graphical methods for solving linear equations and inequalities;
- understand the concepts of interval and linear inequalities;
- methods for solving linear inequalities;
- problem solving and modeling with for example linear equations/inequalities.

Materials

- Relevant textbook in Mathematics or other material;
- Graphing calculator or digital tool (geogebra) for graphical methods;
- Problem solving tasks.

MODULE 2: FUNCTION STUDIES (FOCUS ON LINEAR FUNCTIONS)

(S year 1 E year 1 Before Algebraic Module). Teaching hours: 10-15

Description

- concept of mathematical functions;
- different ways of representing a function;
- linear functions (and constant functions);
- power functions;
- exponential functions.

Learning Objectives

- understand the concepts of function, set of definitions and set of values;
- know the difference between function and relation;
- be able to represent functions in the form of words, function expressions, tables and graphs;
- methods for determining function values;
- digital methods of creating function graphs;
- the concept and properties of linear function;
- the straight line equation;
- the concept and properties of power functions ($f(x) = y = xn$);
- the concept and properties of exponential function ($f(x) = y = an$);
- problem solving and modeling with for example linear models;

Materials

- Relevant textbook in Mathematics or other material;
- Graphing calculator or digital tool (desmos, geogebra) for graphical methods;
- Problem solving tasks.

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